APPENDIX L

CLOSURE PLAN

CLEAN HARBORS COLFAX, LLC

CLOSURE PLAN

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I. PURPOSE

The primary purpose of this plan is to provide a comprehensive analysis of the resources that will be needed to conduct closure and post-closure activities at Clean Harbors Colfax, LLC. In addition, this plan is an integral part of the RCRA Part B Permit for the facility. This plan also provides the Louisiana Department of Environmental Quality (LDEQ) and the U.S. Environmental Protection Agency with documentation of Clean Harbors' intentions, preparations, and capabilities to properly close its thermal treatment facility near Colfax, Louisiana. The plan demonstrates and ensures the technical and financial capabilities of Clean Harbors Colfax, LLC as the owner and operator to carry out closure requirements. This plan describes closure in writing and in detail, so that independently planned steps can be anticipated, enforced, and recorded as actual work progresses. Finally, this plan is comprehensive so that closure work meet the following criteria:

- Safe Completion of Closure Activities - Designed to pose no threat of illness or injury to workers involved in closure activities, to persons using or occupying surrounding property, or to outsiders who may inadvertently approach the facility during closure.

- Orderly and Timely Completion of Closure Activities - Follows preplanned and agreed upon schedules for beginning and completing each step of closure.

- Environmental Soundness of Closure Activities - Designed to present no current or future endangerment to human health or the environment by ensuring that there is no escape of hazardous wastes into the environment.

- 100% RCRA Compliant Closure Activities - Meets requirements of the Hazardous Waste Management Regulations as described by the Louisiana Administrative Code (LAC) and RCRA.

In the unlikely event that all or some portion of the structures and media cannot be adequately decontaminated by way of the means described herein, the facility will propose contingent methodology at such time as it becomes necessary. Prior to implementing such changes to the Closure Plan, the facility will obtain the necessary approvals from LDEQ in accordance with the requirements of LAC 33:V.Chapter 35.

II. SCOPE

This closure plan was developed to describe the activities necessary to close the RCRA-permitted units located at the facility. In the development of the closure process for the subject RCRA units, the facility has assumed that the thermal treatment units can be used for the disposal of all wastes remaining in inventory at the time closure commences as well as some of the waste generated resides as a result of the closure activities. Closure of the

thermal treatment units will occur following the completion of all other RCRA closure activities described in this plan.

Details regarding the scope of the closure of the RCRA units at the facility are described below. Also included is brief summary of the ongoing Risk Based Corrective Action Evaluation Workplan for the "Old Burn Area." Details of the workplan and closure work completed to date are contained in subject workplan (November 1998) in Appendix M of the permit renewal application.

This closure plan includes closure procedures for the storage and treatment units. Detailed closure procedures are presented herein. In addition, brief information regarding the background of the facility and its layout is included below:

A. Site History

The facility initiated operations in June 1985 to assist the Louisiana State Police in treatment of explosives. The hazardous waste management storage units consisted of ATF approved storage magazines. The thermal treatment units were concrete pots or steel troughs located on top of concrete pads.

The facility was contacted by both military and non-military personnel regarding the potential treatment of reactive materials. Reactives and explosives were treated by the facility under a series of Emergency Permits issued by the LDEQ until the final RCRA permit became effective in May 1993.

B. Description of Units

The storage units consist of ten storage magazines that are designed in accordance with requirements established by the Bureau of Alcohol, Tobacco, and Firearms. The magazines are 10 feet by 20 feet in area and 8 feet high. The interior roof, doors, floors, and walls are lined with hardwood paneling (approximately 4 inches thick). Vents are installed in the walls and roofs to permit proper ventilation and to prevent the build-up of extreme heat or pressure.

Liquid storage magazines 8, 9 and 10 are equipped with 12-inch high thresholds at the door openings. The floor vents in these magazines are equipped with 12-inch high extensions.

All magazines are grounded to prevent the occurrence of an accidental fire or explosion from a lightning strike. The doors of the magazines are double locked with 5 tumbler locks and steel hoods. Appendix B of the permit renewal application contains typical cross sections of the magazines.

The thermal treatment area is constructed on a 700' by 130' reinforced concrete slab (6" thick). The thermal treatment units consist of twenty (20) concrete curbed treatment pads

(approximately 16' x 16' x 12 inches high) atop the slab, each equipped with an interchangeable burner assembly. Ten (10) of the burn pads are equipped with a 48-inch diameter by 4-foot tall reinforced concrete culvert topped by a steel cover (14 gauge). The burner assemblies for these ten pads consist of an open 42-inch diameter by 8-inch high steel pan. The other burner assemblies consist of a 6' by 6' square by 20 inches high open steel pan. All metal pans are constructed of 3/16-inch minimum steel thickness. Each of the treatment units is equipped with a retractable roof structure to prevent rainfall accumulation.

The preparation building is 40 feet wide by 40 feet long in plan with a concrete apron at the entrance. There is an L-shaped containment area in the back (approximately 18' x 60' and 10' x 12'). The structure is enclosed on three sides with a roll-up door on the front. The polyethylene washwater tank is located on the perimeter of the main floor area for this unit. The preparation building is supplied with electric power to operate the drill press and band saw used for preparation activities. All electrical switches, motors, controls, and lights conform to the requirements of Class II, Division 2 of the National Electric Code. The building floor plan is shown in Appendix B of the permit renewal application.

A covered truck staging/parking area is provided for overnight parking within the fenced treatment area. The staging/parking area consists of 4 bays constructed of reinforced concrete (approximately 16' x 75' each). Each bay is self-contained with raised curbs and sumps. Appendix B of the permit renewal application shows the foundation plan and details for this unit.

The liquid storage magazines loading/unloading unit is a reinforced concrete secondary containment area (approximately 28' x 75') located adjacent to storage magazines 8, 9 and 10. This area is covered to minimize precipitation accumulation and is designed to contain spilled liquid. The concrete base is sloped toward a centralized sump and raised curbs are located on the perimeter. Appendix B of the permit renewal application shows the foundation plan and details.

The maximum extent of operations that will be active during the life of the facility is the storing of the wastes in the ten storage magazines, ash storage in the ash container storage area, the use of the preparation building, and the treatment of wastes in the twenty open burners. The truck staging and containment areas will only be used for temporary staging of trucks waiting to unload and will not be used to hold waste inventory.

Final closure of the facility will occur when all stored wastes have been treated, treatment by-products have been removed from the site, and all waste management units have been cleaned. The storage magazines and preparation building will remain in service until all stored wastes have been prepared and removed for treatment. The open burners will remain in service until all onsite wastes, storage magazine wood interiors, and spill residues have been treated.

The "Old Burn Area" consisted of ten (10) burn pads and four (4) storage magazines. Operations ceased at the Old Burn Area in 1993 and transferred to the New Burn Area currently in use. Partial closure of this area was completed in 1997. Work included the removal of the burn pads and magazines, excavation of some underlying soils, sampling and analytical testing. Subsequently, a "Risk Based Corrective Action Evaluation Workplan" was submitted to the LDEQ for review and approval in November 1998. Details of the historical and proposed work activities are described in detail in the workplan located in Appendix M of the permit renewal application. This workplan outlined work activities required to complete the site assessment and evaluate the site's risks in accordance with the LDEQ Risk Evaluation/Corrective Action Program (RECAP). The implementation of this workplan will follow its own time schedule and will be completed prior to implementing the facility closure. However, closure cost estimate for this unit are provided in this plan. The workplan should be referenced for closure details. The cost estimate assumes that the results of the RECAP investigation/evaluation will demonstrate that the Old Burn Area in its current condition does not pose an unacceptable threat to human health and the environment and meets the criteria for "no further action at this time."

III. PRE-CLOSURE PREPARATION

A. Waste Scheduling

Generators, transporters, customers, and other parties involved in the shipment of wastes to the facility will be given appropriate notice of impending closure. The Closure Coordinator will ensure that the final shipments are scheduled to allow for disposal prior to the commencement of closure activities.

B. Equipment Inventory

The Closure Coordinator will prepare an equipment inventory, determining the proposed disposition of each item. The inventory will include the extent to which any item will be decontaminated and list the intended destination of any item to be removed from the site.

IV. CLOSURE ACTIVITIES

A. Closure of the Burn Unit and Associated Structures

At closure, the wastes stored in the magazines will be moved to the preparation building, and then the materials will be thermally treated in the burners. Untreated reactive material

spilled during the preparation and treatment procedures will be collected immediately and thermally treated. Ash residue generated from treatment will be collected and containerized for proper disposal. Disposal will comply with the Land Disposal Restrictions contained in LAC 33:V.Chapter 22. The treatment area concrete pad will be cleaned with mechanical sweepers or by manual sweeping and scrubbing, as needed. Residues will be disposed at an appropriate permitted facility.

Subsequent to final treatment and removal of waste, the steel burner assemblies (pans) and retractable roof covers will be dismantled and scrapped (smelter and not for reuse). The concrete burn pads will be removed and disposed at an appropriate permitted facility.

The treatment area concrete pad will then be pressure washed using an industrial detergent followed by a clean water rinse(s). The final rinsate from the pad will be sampled to demonstrate clean closure. The final rinsate from the pad will be sampled in each of the sump areas and analyzed for VOCs (SW-846 Method 8260, total metals (As, Ba, Cd, Cr, Pb, Hg, Se, Ag, Cu, Ni, V, Zn, Sb, Tl and Be) using SW-846 Method 6010B and SW-846 Method 7470A, and extractable explosives (SW846 Method 8330). If the rinsate target constituent concentrations exceed TCLP, the rinsate will be treated as hazardous waste. Any contaminated rinsate will be pumped into a tanker truck or mobile storage tank (e.g., frac tanks) prior to being transported offsite to an approved permitted facility in accordance with all applicable requirements of LAC 33:V Chapter 22. If constituent concentrations are below background levels, the rinsate will be disposed of offsite as non-hazardous.

The detention pond was constructed to control the discharge rate of surface water offsite and is not a regulated storage unit. A 60 mil HDPE liner was placed over compacted subgrade to prevent migration of liquid to subsurface soil. Liquid head over the liner, which is the driving force for liquid migration through the liner, is a temporary phenomenon that occurs during significant storm events. The permeability of the liner is negligible. Therefore, impact to subsurface soil from detention of surface water is considered to be highly unlikely. The pond discharge is regulated through the Federal NPDES Storm Water program and is sampled in accordance with permit requirements. Any change in the discharge water quality will be detected and assessed through this program.

Even though the detention pond is not a RCRA regulated unit, the facility will examine subsurface soil below the pond in order to address LDEQ concerns regarding potential impact of surface water flow. Initially, accumulated sediment inside the pond, if any, will be sampled and analyzed for volatile organic compounds (VOCs) using SW-846 Method 8260, metals (using SW-846 Method 6010B and SW-846 Method 7470A), and extractable explosives by SW-846 Method 8330.

In addition to sampling accumulated sediment, the facility will sample soil beneath the HDPE liner at the location most likely to be impacted by surface water contaminant migration. This worst case area is located at the tie-in of the HDPE to the concrete discharge structure since the liquid head is greatest at this point. Discrete soil samples will be collected at this location at the surface and at a depth of 16 inches.

All samples will be collected using procedures described in the Sampling and Analysis Plan and will be analyzed for VOCs, total metals and extractable organics using the appropriate SW-846 Methods as identified in the previous section. Sediment and subsurface soil will be considered potentially impacted if the target constituents exceed the criteria described in Section G of this closure plan.

If accumulated sediment contains target compound concentrations greater than the closure criteria levels, it will be removed and disposed offsite at an approved permitted facility in accordance with the requirements of LAC 33:V.Chapter 22. If concentrations of target compounds exceeding closure criteria levels are found in soil beneath the liner a soil assessment plan for the detention pond will be developed. This assessment plan will address the vertical and horizontal extent of contamination. The plan will be submitted to the LDEQ for approval within 60 days of receipt of initial soil analytical results and will contain a schedule of implementation.

Other areas to be closed including the storage magazines, preparation building, truck staging and containment areas, and the ash container storage area will then be closed. The buildings and concrete pads will remain onsite or be removed at the facility's discretion.

The maximum extent of operations that will be active during the life of the facility is the storing of the wastes in the ten storage magazines, ash storage in the ash container storage area, the use of the preparation building, and the treatment of wastes in the twenty open burners. The truck staging and containment areas will only be used for temporary staging of trucks waiting to unload and will not be used to hold waste inventory.

Final closure of the facility will occur when all stored wastes have been treated, treatment by-products have been removed from the site, and all waste management units have been cleaned. The storage magazines and preparation building will remain in service until all stored wastes have been prepared and removed for treatment. The open burners will remain in service until all onsite wastes, storage magazine wood interiors, and spill residues have been treated.

B. Closure of the Truck Staging Area

Although this area is not a permitted waste management unit, the ash container storage area will be closed after all ash, spill residue and burner units have been removed from site. The truck staging and containment areas will no longer be required for receiving wastes when closure is initiated; however, they will remain in service for equipment decontamination as required until closure of other areas/units is complete.

The maximum inventory of untreated waste that would be onsite at any time during the operating life of the facility is provided in Table II of Part I. This value assumes all magazines are full, the burn pads are loaded, the preparation building has a full day's burn in processing, and the truck unloading area has a full day's burn waiting to be unloaded. The

specific activities required to meet the closure performance standard for existing and proposed units are discussed below.

Once all equipment has been decontaminated, the concrete containment areas will be pressure washed with a water/detergent followed by a fresh water rinse. Samples of the fresh water rinse will be collected from each sump and analyzed as described above for the direct burn area.

C. Closure of the Storage Magazines

Once all of the waste has been removed from the storage magazines, the wood interior will be manually swept to remove any loose debris. This material will be thermally treated in burn pans. Following this, the wood interiors will be removed and either thermally treated onsite and/or shipped offsite for disposal. Subsequent to removal and thermal treatment of the wood interiors, all ten magazines (storage units) shall be torched to remove any trace of reactive material. The interior will be then pressure washed with fresh water.

The final rinsewater for each magazine shall be sampled (one sample per magazine) within the unit and analyzed for VOCs (SW846 Method 8260), total metals (As, Ba, Cd, Cr, Pb, Hg, Se, Ag, Cu, Ni, V, Zn, Sb, Tl and Be) using SW-846 Method 6010B and SW-846 Method 7470A, and extractable explosives (SW846 Method 8330).

If extractable explosives or volatile organic compounds are detected based upon the lower detectable limits established by the analytical method, or if the concentrations of metals exceed background levels as established through analysis of source water, a decision will be made to repeat decontamination procedures or to declare the unit hazardous and dispose in a permitted facility. It is anticipated that one decontamination event will be required per unit in order to clean close. If the rinsewater clean closure criteria constituents are below background levels, the facility will dispose offsite as non-hazardous.

Once decontamination is complete, the magazine's metal exterior shell maybe left in place and/or scrapped (smelter and not for reuse).

Following closure of the liquid storage magazines, the concrete unloading area will be pressure washed with a water/detergent followed by a fresh water rinse. A sample of the fresh waster rinse will be collected from the sump following the procedures described above.

D. Closure of the Preparation Building

The preparation building will be closed by first cleaning and removing all equipment. Equipment will be cleaned by pressure washing with a water/detergent followed by a fresh water rinse. The equipment will then be removed from the building for further use at the owner's discretion.

After equipment removal, the building floor and walls will be pressure washed with a water/detergent followed by a fresh water rinse. Any deposits not removed by water washing will be scraped using hand tools. Washwater will be analyzed and handled as described for the storage magazines. Decontamination will be confirmed through final rinse analysis following the same procedures as described above.

E. Soil Sampling and Analysis

After all waste has been thermally treated, soil in the vicinity of the storage and treatment areas will be examined for signs of spillage. It is not anticipated that spilled waste will be present; however, any spilled waste will be removed with hand tools. Hand tools will be cleaned by detergent wash and clean water rinse with the washwater going to the polyethylene washwater tank. If at least one half of the removed media is spilled waste, then this removed media should be treated in the burners. If the spilled waste makes up less than one half of the removed media, then, the media must be sent to a permitted facility for treatment or disposal in accordance with Land Disposal Restrictions. Also, a surface soil sample will be collected after removal of the spilled material to verify the area is clean. The surface sample will be analyzed for VOCs (SW846 Method 8260), total metals (As, Ba, Cd, Cr, Pb, Hg, Se, Ag, Cu, Ni, V, Zn, Sb, Tl and Be) using SW-846 Method 6010B and SW-846 Method 7470A, and extractable explosives (SW-846 Method 8330).

After storage magazines 1 - 7 have been closed, a discrete surface soil sample will be collected from an area adjacent to each entry. The discrete samples will be analyzed for the same constituents as listed above. If the levels of detectable compounds exceed the established criteria for clean closure, the following procedures will be implemented. Otherwise, the soil will be considered to be at background levels.

For the magazine(s) that show target constituents above closure criteria levels, the top six (6) inches of soil will be excavated from an area approximately four (4) feet by six (6) feet immediately adjacent to the concrete slab at the front entrance of the magazine. This will result in approximately 0.5 cubic yards of soil per unit where excavation is required. This soil will be sent to a permitted facility for disposal. Disposal will comply with the Land Disposal Restrictions contained in LAC 33:V.Chapter 22. Subsequent to soil removal a confirmation surface soil sample will be collected from the excavated area. The confirmation sample will be analyzed for the above stated parameters. If the confirmation sample meets the established criteria for clean closure described above, then the storage magazine area will be considered clean closed.

All soil samples collected for VOC analysis will be collected in accordance with SW-846 Method 5035, and all analyses will be completed by an LDEQ accredited laboratory. For purposes of establishing clean closure, all sample results will be compared to RECAP values.

F. Disposal of Residuals

After the reactive wastes, storage magazine wood interiors, and any spill residues are thermally treated, the ash will be removed from the burners and containerized for disposal offsite. Disposal will comply with the Land Disposal Restrictions contained in LAC 33:V.Chapter 22. The metal trough burners, grates and retractable roof covers will be scrapped (smelter and not for reuse). The concrete burners pads will be disposed. These materials will be removed and containerized, or they will be loaded directly onto trucks for disposal at an approved facility. The burners, ash, spill residue, and concrete burn pads from burner locations which handled listed waste will be containerized and disposed of at a hazardous waste landfill site.

If VOCs or extractable explosives are detected above the lower detectable limits established by the analytical method, or if the concentrations of metals exceeds closure criteria levels, a decision will be made either to repeat decontamination procedures or to declare the unit hazardous and dispose in a permitted facility in accordance with the Land Disposal Restrictions of LAC 33:V.Chapter 22. It is anticipated that one decontamination event will be required per unit in order to clean close.

The soil surrounding the treatment area will be assessed through the Soil Monitoring Plan (Appendix Z). Soil sampling locations 13, 14, 15, 16, and 17 are located in the immediate vicinity of the treatment area. If closure occurs later than 180 days after the last Soil Monitoring Plan sampling event and treatment has occurred within that period, these sampling locations will be resampled and analyzed in accordance with the Plan. If it is determined that the soil in the vicinity of the treatment area has been impacted, an assessment plan will be developed as described previously for the detention pond.

At this time it is anticipated that an appropriate, approved and permitted landfill will be used to dispose of solid treatment residues for the purpose of this closure plan. Disposal will comply with the Land Disposal Restrictions contained in LAC 33:V.Chapter 22.

An appropriate, approved and permitted liquids treatment facility will be used to dispose of washwater and rinsate. The basis for the quantities of wastes, residues and decontamination liquids are provided in Exhibit III. All materials will collected, containerized and disposed offsite at an approved permitted facility in accordance with the Land Disposal Restrictions of LAC 33:V. Chapter 22.

G. General Sampling, Analysis and Evaluation Requirements

All soil and water samples will be collected and analyzed in accordance with approved methods under SW-846. All sampling procedures will be designed to minimize the possibility of cross contamination and sample mismanagement. Sample containers which have been prepared by the receiving laboratory will be used with no further field preparation. All samples will be collected in accordance with the procedures outline in

LDEQ's "Risk Evaluation/Corrective Action Program" (RECAP) document, latest edition, where applicable.

All soil and sediment samples taken for VOCs will be collected in accordance with USEPA SW-846 Method 5035. Otherwise soil and sediment samples will be collected using stainless steel spoons or a gloved hand to place the sample into the sample container. Sampling personnel shall wear a separate pair of disposable latex gloves for each sampling point.

Water samples will be collected directly from the final rinsate subsequent to cleaning operations. At each sampling location sampling personnel will wear a separate pair of disposable latex gloves. All sample containers for organic analysis will be filled completely to minimize or eliminate headspace between the sample and the container cap. Care will be taken to minimize disturbance of the sample.

Sample locations will be marked in the field and identification numbers will be assigned to each point. All sample containers will be labeled immediately after sample collection with a unique identification number to reflect the location and depth at which the sample was taken. Other information which will be provided includes the names of sampling personnel, time and date.

Sample containers will be cooled to 4 degrees Celsius and will be shipped to the laboratory within 24 hours of collection. A chain-of-custody record will accompany the shipment and every precaution will be taken to ensure that the sample integrity is maintained from point of collection to the laboratory.

An LDEQ accredited laboratory will complete all analyses. As required by RECAP, the laboratory will utilize SW-846 methods that will provide sample quantitation limits at the lowest practical quantitation limits (PQLs). These PQLs will generally be at or lower than any risk-based corrective action level (i.e. RECAP Screening Standard, background level, or other derived RECAP standard). The LDEQ accredited laboratory prior to initiating closure activities will confirm the PQLs for all constituents. Any detection limit variances required by the laboratory will be reported to the LDEQ.

The rinsate, soil and sediment sample results will be compared to RECAP values. The naturally occurring constituents (e.g. metals) will be compared to background values, and/or screening standards. Background levels will be developed in accordance with RECAP standards. Non-naturally occurring constituents (e.g. VOCs and extractable explosives) sample results will be compared to the RECAP Screening Standards, unless a higher tier of RECAP evaluation is performed and approved by the LDEQ. Prior to closure, the source of water for these proposed closure activities will also be sampled for both the naturally and non-naturally constituents. These sampling results will form the basis for background values to be used in evaluating the final rinsate samples. Additional decontamination and re-sampling efforts are anticipated, and a reasonable cost estimate is included in this plan for such purposes.

V. STAFFING

A. Closure Coordinator

1. Qualifications:

The Closure Coordinator will have a technical education and experience in management of a hazardous waste facility. He/she will be well versed in thermal treatment of reactive materials and will be intimately familiar with the details of this plan. During pre-closure and closure periods, the General Manager may serve as Closure Coordinator.

2. Duties:

In preparation prior to closure, the Closure Coordinator will keep this plan current with periodic updates to reflect changes in the facility, in cost of implementation, or in applicable regulations. During closure, the Closure Coordinator will manage the facility until all wastes are thermally treated using standard operating procedures. After waste treatment operations are completed, the balance of closure procedures will be carried out under the supervision of the Closure Coordinator. He/she will serve as the Clean Harbors Colfax, LLC contact person for LDEQ inspection, evaluation, and approval activities. Finally, he/she will ensure that post-closure inspection and maintenance activities are accomplished as scheduled.

B. Closure Engineer

1. Qualifications

The Closure Engineer will be a Registered Louisiana Professional Engineer. He will be familiar with the design and operation of the facility. He will be thoroughly knowledgeable regarding all aspects of this plan. During closure, the Closure Engineer may also serve as Closure Coordinator.

2. Duties

The Closure Engineer will be available to consult in the formulation and any necessary revisions in this plan. He will be present to supervise the closure, so that closure activities are accomplished in accordance with this plan. After closure, the Closure Engineer will prepare and submit the certification required by the LAC 33:V.3517. Upon completion of post-closure care, the Closure Engineer will be responsible for the preparation and submittal of the certification required by LAC 33:V.3523.

VI. ADMINISTRATIVE REQUIREMENTS

A. Plan Review and Updating

1. Periodic Review

This plan will be reviewed by the Closure Coordinator and revised as necessary. The scope of planned closure activities will be expanded to include any modifications in processes, new construction, or changes in the capacity of wastes stored, treated, or disposed at the facility.

Costs of the above plan changes will also be included in the plan cost estimates. The cost estimate for closure will also be adjusted for inflation on an annual basis as required by LAC 33:V.3705 and 3709.

After a plan review, updating, and re-evaluation of costs, a revised plan will be prepared. Copies of the revised plan will be made available to the LDEQ and will be maintained at all time at the facility.

2. Other Required Reviews

After any significant changes in the facility operations or equipment and associated permit modifications, this plan will be reviewed to determine if changes are necessary.

Prior to the anticipated closure, this plan will be reviewed to ensure that all proposed actions and estimated costs are accurate and up-to-date. The plan schedules will be converted from elapsed time to actual dates. A final implementation revision of the plan will be prepared and submitted to the Office of Environmental Services, Permits Division of LDEQ, at the time of notification of intention to close.

B. Notification of Intention to Close

1. Closure Engineer

The Closure Engineer will be notified of intended closure well in advance of closure activities. If necessary, he/she should provide consultation in preparing the final implementation revision of this plan, and support pre-closure preparations.

2. Office of Environmental Services, Permits Division (OESPD)

The Closure Coordinator will give written notification to the OESPD at least

180 days before commencing any closure activities. The following information will be provided:

a. date of planned closure;
b. requested changes, if any, in the closure plan which take advantage of new technology, unforeseen situations, and other requests which improve the safety of the closed facility;
c. closure schedule and estimated costs of each phase of the closure plan; and
d. request for release of closure funds in amounts and times as required by the closure schedule (to the extent applicable).

VII. COST ESTIMATES

A. Basis of Cost Estimates

Costs are based on the most expensive set of normal operating circumstances. This assumes a greatest extent/worst case situation but does not presuppose any spills or other accidental occurrences.

The closure cost basis calculations and references are included in Exhibit III.

All costs estimates are based on 2003 dollars.

B. Total Costs Summary

Costs are summarized for Closure activities. A contingency of 10 percent is included. Refer to Exhibit IV.

IX. FINANCIAL ASSURANCE - CLOSURE

In accordance with LAC 33:V.3509.B, Clean Harbors Colfax, LLC will comply with the "Financial Assurance for Closure", LAC 33:V.4403, by providing OESPD with financial assurance in the form of insurance, providing OESPD with sufficient funds to cover the anticipated closure activities. Financial assurance documentation is provided in Appendix N.

EXHIBIT I

MAXIMUM PERMITTED OFF-SITE WASTE INVENTORY

Waste Status	Amount	
Storage in Containers	593	cubic yards
Total hazardous waste storage inventory at closure: (50,000 pounds Net Explosive Weight)	**593**	**cubic yards**

Including waste in process, the total that might be present at the site (worst case) is 55,950 pounds of Net Explosive Weight.

EXHIBIT II

CLOSURE SCHEDULE

Action to be Taken	Days from Closure Start Date
Revise Plan (if needed)	-240 to -180
Notify LDEQ	by -180
Prepare Equipment Inventory	-180 to -30
Prepare Waste Schedule	-30 to -5
Receive Wastes	to -1
Begin Closure	0
Treat Stored Wastes	0 to +18
Closure Engineer to Inspect Empty Magazines	+18 to +25
Mobilize Decontamination Contractor	+25 to +32
Decontaminate Equipment, Removal & Clean-up	+32 to +65
Closure Engineer to Verify Decontamination	+65 to +125
LDEQ and Closure Engineer Inspection	+125 to +155
Conduct Measures to Achieve LDEQ Approval	+155 to +180
Complete Closure	by +180
Submit Closure Certification to LDEQ	by +240

EXHIBIT III

CLOSURE COST BASIS CALCULATIONS

Closure Plan – Closure Cost Estimates Quantities

Assumptions: Detergent Wash @ 800sf/hour
Fresh Water Rinse @ 800sf/hour
Disposal of Waters @ Deep Well in Plaquemine, La @ $0.13/gal.
Transportation Colfax to Plaquemine = 202.6 miles @ $3.10/mi. = $628.06/load or $628.06/5500 gal/load = $0.12/gal.
Total T&D = $0.25/gal.
Onsite Disposal Cost $5,000/day
Disposal of Residues/Debris @ Chem Waste Carlyss @ $150/cy
Transportation Colfax to Carlyss = 146.3 miles @ $3.10/mi. = $453.53/load
Sampling and Analytical Testing Costs – Rinsate = $400/ea.
Sampling and Analytical Testing Costs – Soil/Sediment = $500/ea.
Closure Supervisor - $50.00/hr.
Closure Engineer - $75.00/hr.

Waste Disposal (Inventory)

55,950 pounds maximum weight (net explosives)

Burn rate @ 3,150#/day = 55,950/3150 = 18 days

Waste Residues = 30 cy or 2 roll off containers = 2 loads

10 each Storage Magazines (Reference Drawings 108-110)

10 feet x 20 feet x 8 feet high; Interior floor, walls, ceiling and doorway covered with 4-inch thick hardwood.

Total surface area per magazine = 2(10'x20') + 2(10'x8') + 2(20'x8') = 880 sf.

Total surface area = 10 x 880 = 8800 sf.

Volume of Wood = 8800 sf x 4"/12 = 2933.3 cf

Add 10% for 2x4 nailer = 2933.3 x 0.10 = 293.3 cf

Total Volume of Wood = 3,227 cf or = 3,227/27 = 120 cy.

Removal of Wood @ 1 hours/magazine x 10 = 10 hours

Torching of Magazines @ 1 hours/magazine x 10 = 10 hours

Time required per wash cycle = 8800/800 = 11 hours

Time required per rinse cycle = 8800/800 = 11 hours

Assume 1 additional wash/rinse cycle required for 1 magazine = 880/800 + 880/800 = 2.2 hours

Total time for 1 wash and 1 rinse cycles = 24.2 hours

Amount of water generated for wash and rinse cycles = 24.2 x 200 = 4,840 gallons

Truck Parking/Staging Area:

Floor surface area (4 bays) = 68' x 75' = 5100 sf (Reference Drawing # 107)

Curb surface area = 8 x 1.33 x 75' = 798 sf

Sumps surface area = 4 x 2' x 2' x 5 = 80 sf

Total surface area = 5100 + 798 ÷ 80 = 5978 sf

Total surface area per bay = 5978/4 = 1494.5 sf

Time required for wash cycle = 5978/800 = 7.5 hours

Time required for rinse cycle = 5978/800 = 7.5 hours

Assume 1 additional wash/rinse cycle for 1 bay = 1494.5/800 + 1494.5/800 = 1.9 + 1.9 = 3.8 hours

Total hours = 7.5 + 7.5 + 3.8 = 18.8 hours

Amount of water generated for wash and rinse cycles = 18.8 x 200 = 3,760 gallons

Preparation Building:

Total Floor Surface Area = (39.6' x 40') + (18'x60') ÷ (10'x12') = 2,784 sf (Ref. Drawings 111-113)

Time required per wash cycle = 2784/800 = 3.5 hours

Time required per rinse cycle = 2784/800 = 3.5 hours

Total hours = 7.0 hours

Assume 10% of area requires additional wash/rinse = 0.7 hours

Total hours = 7.7 hours

Amount of water generated for wash and rinse cycles = 7.7 x 200 = 1,540 gallons

Truck Unloading – Liquid Storage Magazine Area:

Floor Surface Area = 28' x 75' = 2100 sf (Reference Drawing 107)

Sumps = 2' x 2' x 5 sides = 20 sf

Curbs = (6"/12) x 2 x 75' = 75 sf

Total Surface Area = 2100 + 20 + 75 = 2,195 sf

Assume 10% of Area requires additional wash/rinse = 2,195 x 0.10 = 220 sf

Total Surface Area = 2195 + 220 = 2,415 sf

Time required for wash cycle = 2415/800 = 3.0 hours

Time required for rinse cycle = 2415/800 = 3.0 hours

Total hours = 6.0 hours

Amount of water generated during wash/rinse cycles = 6.0 x 200 = 1,200 gallons

Burn Pad Area:

Removal of burn pad pedestals @ 1 hours each x 20 = 20 hours

Volume of concrete burn pad pedestals = (20 x 16' x 16' x 1.5') + 10[(3.14x4') x 4' x (4"/12)]

= 5120 + 14 = 5,136 cf or 5,136/27 = 190 cy

Transportation = 190/20 = 10 loads

Metal burn pans and retractable roof covers – assume scrapped (scrap value = transportation costs)

Floor Surface Area = 700' x 130' = 91,000 sf

Sumps = 3 each x 2' x 2' x 5 = 60 sf

Curbs = (700' x 6"/12) + 2(130'x1.25') + (700x2') = 2075 sf

Total = 91,000 ÷ 60 ÷ 2075 = 93,135 sf

Assume 10% of area requires additional wash/rinse cycle = 93,135 x 0.10 = 9,314 sf

Total surface area = 93,135 ÷ 9314 = 102,449 sf

Time required for wash cycle = 102,449/800 = 128.1 hours

Time required for rinse cycle = 102,449/800 = 128.1 hours

Total hours = 128.1 ÷ 128.1 = 256.2 hours

Amount of water generated during wash/rinse cycles = 256.2 x 200 = 51,240 gallons

Total hours = 10 + 10 +24.2 + 18.8 + 7.7 + 6 + 20 – 256.2 = 352.9 hours

Assume 2 men @ 10 hour/day = 352.9/2x10 = 18 work days or 36 man-days

Total Volume of water = 4,840 + 3,760 + 1,540 + 1,200 + 51,240 = 62,580 gallons

Analytical Samples:

Rinsate Samples = Water Source (1) + Magazines (10 + 1) + Truck Parking/Staging Area (4 +1) + Preparation Building (1+1) + Truck Unloading (1+1) + Burn Pad (3 +1) = 25

Soil/Sediment Samples = Pond (2 +1) + Magazines (7 + 1) + Burn Pad (Annual Soil Sampling –17) = 28

Equipment Rental – assume 1 month:

Pressure Washer – $450/month

Frac Tank – $500/month

Vacuum Unit – $4,500/month

Vacuum Box – $270/month

PPE – $25/man day

Excavator/Loader - $1,575/month

Contingency Soil Excavation and Removal – Magazines and Pond Areas:

Assume 10 cy each removed from Magazine and Pond Areas

Assume 5 confirmation soil samples required

Closure Coordinator and Closure Engineer:

Closure Coordinator – 1 month or 175 hours

Closure Engineer – 80 hours

Exhibit IV

Closure Cost Estimate

Facility Closure

Disposal of Remaining Waste Inventory	Quantity	Unit	$	/Unit	Total
Onsite preparation and treatment of waste	18	days	$ 5,000.00	day	$90.000
Residue disposal	30	cy	$ 150.00	cy	$4,500
Transportation (2 loads)	2	ea	$ 455.00	ea	$910
	Sub-Total				**$95,410**

Decontamination of Magazines	Quantity	Unit	$	/Unit	Total
Wood Removal/Torching-Labor	20	hr	$ 22.00	hr	$440
Ash Disposal	20	cy	$ 150.00	cy	$3,000
Ash Transportation	1	ea	$ 455.00	ea	$455
Pressure Wash/Rinse Rinse-Labor	24.2	hr	$ 22.00	hr	$532
Washwater Transportation and Disposal	4840	gal	$ 0.25	gal	$1,210
	Sub-Total				**$5,637**

Truck Parking/Staging Area	Quantity	Unit	$	/Unit	Total
Pressure Wash/Rinse Floors (Labor)	18.8	hr	$ 22.00	hr	$414
Washwater Transportation and Disposal	3760	gal	$ 0.25	gal	$940
	Sub-Total				**$1,354**

Preparation Building Decontamination	Quantity	Unit	$	/Unit	Total
Equipment Cleaning/Removal (Labor)	8	hr	$ 22.00	hr	$176
Pressure Wash/Rinse Floors-Labor	7.7	hr	$ 22.00	hr	$169
Washwater Transportation and Disposal	1540	gal	$ 0.25	gal	$385
	Sub-Total				**$730**

Truck Unloading - Liquid Storage Mag. Area	Quantity	Unit	$	/Unit	Total
Pressure Wash/Rinse Rinse-Labor	6	hr	$ 22.00	hr	$132
Washwater Transportation and Disposal	1200	gal	$ 0.25	gal	$300
	Sub-Total				**$432**

Treatment (Burn) Area Concrete Pad Decon	Quantity	Unit	$	/Unit	Total
Removal of burn pad pedestals-Labor	20	hr	$ 22.00	hr	$440
Disposal of concrete	190	cy	$ 150.00	cy	$28,500
Transportation of concrete	10	loads	$ 455.00	load	$4,550
Pressure Wash/Rinse Floors-Labor	256.2	hr	$ 22.00	hr	$5,636
Washwater Transportation and Disposal	51240	gal	$ 0.25	gal	$12,810
	Sub-Total				**$51,936**

Soil/Rinse Water Sampling and Analysis	Quantity	Unit	$	/Unit	Total
Rinsate Samples	25	ea	$ 400.00	ea	$10,000
Soil/Sediment Samples	28	ea	$ 500.00	ea	$14,000
	Sub-Total				**$24,000**

Excavation/Disposal of Soils	Quantity	Unit	$	/Unit	Total
Storage Magazines	10	cy	$ 150.00	cy	$1,500
Detention Pond	10	cy	$ 150.00	cy	$1,500
Transportation (one truck)	1	ea	$ 455.00	ea	$455
Confirmation Samples	5	ea	$ 750.00	ea	$3,750
	Sub-Total				**$7,205**

Exhibit IV-continued

Closure Cost Estimate

Misc. Equipment and Supplies	Quantity	Unit	$	/Unit	Total
Mobile Tank Rental (1 month)	1	mo	$ 500.00	mo	$500
Pressure Washer (2 each for 1 month)	2	mo	$ 450.00	mo	$900
Vacuum Unit (1 month)	1	mo	$ 4,500.00	mo	$4,500
Roll Off/Vacuum Boxes (2 total for 1 month)	2	mo	$ 270.00	mo	$540
Excavator/Loader (1 month)	1	mo	$ 1,575.00	mo	$1,575
Biodegradable Detergent	1	ea	$ 200.00	ea	$200
Personnel Protective Equipment	36	man-days	$ 25.00	ea	$900
Sampling Supplies and Misc. Costs (Shipping and Handling)	1	ea	$ 2,000.00	ea	$2,000
Decontamination of Hand Tools and Misc. Cleanup Activities	1	ea	$ 1,500.00	ea	$1,500
	Sub-Total				**$12,615**

Engineering Certification/Inspections	Quantity	Unit	$	/Unit	Total
Closure Coordinator	175	hr	$ 50.00	ea	$8,750
Closure Engineer	80	hr	$ 75.00	ea	$6,000
	Sub-Total				**$14,750**

Sub-Total Facility Closure Cost Estimate	**$214,070**
Contingency (10%)	**$21,407**
Total Facility Closure Cost Estimate	**$235,477**

RECAP Closure of "Old Burn Area"

Field Work	Quantity	Unit	$	/Unit	Total
Field Sampling Crew	8	days	$ 2,200.00	ea	$17,600
Surveying-Field	2	days	$ 1,250.00	ea	$2,500
Surveying-Office	2	days	$ 500.00	ea	$1,000
Analytical Testing-Soil Samples	90	ea	$ 500.00	ea	$45,000
Sample Shipment	1	lump sum	$ 3,000.00	ea	$3,000
	Sub-Total				**$69,100**

RECAP Data Evaluation and Reporting	Quantity	Unit	$	/Unit	Total
Project Manager	240	hr	$ 72.00	hr	$17,280
Technician	240	hr	$ 56.00	hr	$13,440
Clerical	60	hr	$ 32.00	hr	$1,920
Drafting	60	hr	$ 45.00	hr	$2,700
Principal	40	hr	$ 96.00	hr	$3,840
Reproduction	1	lump sum	$ 4,500.00	ea	$4,500
	Sub-Total				**$43,680**

Sub-Total RECAP Closure Cost Estimate	**$112,780**
Contingency (10%)	**$11,278**
Total RECAP Facility Closure Cost Estimate	**$124,058**

Total Facility and RECAP Closure Cost Estimate	**$359,535**

APPENDIX M

RISK-BASED CORRECTIVE ACTION EVALUATION WORKPLAN (1998)

Safety-Kleen

November 19, 1998

James H. Brent, Ph.D.
Administrator
Louisiana Department of Environmental Quality
Hazardous Waste Division
P.O. Box 82178
Baton Rouge, LA 70884-2178

RE: Revised RECAP Workplan, Old Burn Area
Safety-Kleen (Colfax), Inc.
EPA ID # LAD 981 055 791

Dear Dr. Brent:

Enclosed please find five (5) copies of the above referenced Revised RECAP Workplan for you review and comments.

This workplan was previously submitted to Louisiana Department of Environmental Quality (LDEQ) in September 1997. Comments outlining technical deficiencies were received from LDEQ in your letter of April 29, 1998. This revised Workplan addresses the LDEQ comments. Specific Workplan references and short responses to the LDEQ comments are attached to this letter for your reference.

If you have any questions you can call me at (318) 627-3443 or Mike Wisniowiecki at (281) 884-7064.

Sincerely,

James E. Gallion, Sr.
Facility Manager

cc: Lin Longshore
Jerry Correll

3763 HIGHWAY 471 COLFAX, LA 71417 318/627-3443 FAX 318/627-3448

LAIDLAW
ENVIRONMENTAL
SERVICES INC.

November 12, 1998

Mr. Jim Gallion
Facility Manager
Safety-Kleen (Colfax), Inc.
Colfax, LA 71417

RE: Revised RECAP Workplan
Old Burn Area
Safety-Kleen (Colfax), Inc. Facility
Colfax, Louisiana
LAD No. 981 055 791

Dear Mr. Gallion:

The Consulting Services Group of Safety-Kleen Corporation (formerly Laidlaw Environmental Services) is pleased to present the enclosed copy of the referenced Workplan. This Workplan was previously submitted to Louisiana Department of Environmental Quality (LDEQ) in September 1997. Comments outlining technical deficiencies were received from LDEQ in their letter of April 29, 1998. This revised Workplan addresses these LDEQ comments. Specific Workplan references and short responses to the LDEQ comments are attached to this letter for your reference.

If you have any questions or comments regarding this report, please contact Michael Wisniowiecki at (281) 884-7064.

Sincerely,

Michael J. Wisniowiecki, P.G.
Project Manager

for Christopher A. Dacey
Senior Hydrogeologist

Attachment: Workplan References and Short Responses to LDEQ Comments
Enclosure: Revised RECAP Workplan

cc: John Arbuthnot - SK, Baton Rouge, LA
Lin Longshore, SK, Columbia, SC w/out enclosure
B. Geoffrey Jones - SK, Columbia, SC w/out enclosure
Susan Flack - SK Consulting Services, Boulder, CO

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Laidlaw Environmental Services, Inc.
515 West Greens Road, Suite 600 Houston, Texas 77067
Waste 800.283.2483 Phone 281.884.7000 Fax 281.884.7037

LAIDLAW
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SERVICES INC.

RESPONSES TO COMMENTS IN APRIL 29, 1998 LDEQ LETTER

A Workplan for the assessment of the Old Burn Area of the Colfax facility was previously submitted to Louisiana Department of Environmental Quality (LDEQ) in September 1997. Comments outlining technical deficiencies were received from LDEQ in their letter of April 29, 1998. The revised Risk Evaluation/Corrective Action Program (RECAP) Workplan addresses these LDEQ comments. Specific Workplan references and short responses to the LDEQ comments are given below:

LDEQ Comment 1: *General Comments The Louisiana Department of Environmental Quality has published and begun the rulemaking process on the April 1998 proposed Risk Evaluation/Corrective Action Program (RECAP). Although the 1998 RECAP document has not yet been promulgated into regulation, the Hazardous Waste Division (HWD) considers RECAP the most appropriate guidance currently available on which to base a risk based corrective action workplan. The HWD strongly recommends that Laidlaw use the proposed RECAP document as the basis for their workplan. . . . .*

Comment 1 Response: Revisions have been made throughout the Workplan in order to comply with the proposed RECAP guidance as requested.

LDEQ Comment 2: *Potential Surface Soil Laidlaw should consider potential surface soil in the workplan and in sample collection efforts. Potential surface soil shall be defined as soil present from ground surface to the depth of impact or ground surface to 15 feet below ground surface (bgs) if the depth of impact is greater than 15 feet. . . .*

Comment 2 Response: As stated in Sections 2.0 and 7.2.2 of the revised Workplan, Safety-Kleen (formerly Laidlaw) will consider potential surface soil in the delineation of the Area of Investigation (AOI) as defined by RECAP guidance. Soil sampling performed in 1996 did not fully delineate the AOI. Although metals results were of limited use, volatile organic and extractable explosive results can be used in AOI delineation. We are proposing a sampling plan to address data gaps in the previous work and fully delineate the AOI. It should be noted that sandstone outcroppings of the Catahoula Formation have been observed in shallow excavations at the Site, and that unconsolidated soils may not be present below relatively shallow depths across the Site.

LDEQ Comment 3: *Submittal Requirements The Laidlaw workplan submittal should also include: - Topographic map with AOI labeled and name of quadrangle; . . . .*

Comment 3 Response: Responses to this comment can be found at several locations within the revised Workplan. All requested figure revisions have been made. A description of land use at and in the vicinity of the AOI is included in Section 3.0. Groundwater use at and in the vicinity of the AOI is also presented in Section 3.0, and a Department of Transportation and Development (DOTD) well survey is included in Appendix A. Analytical methods and quantitation limits to be used are identified in Table 2, and QA/QC data to be collected are described in Section 7.4.2 and in Appendix C.

LDEQ Comment 4: *Site Investigation The site investigation in the Laidlaw workplan is inadequate. AOI investigation efforts shall include, but not be limited to:. . . .*

Comment 4 Response: Section 7.0 has been revised to comply with the site investigation efforts required by the LDEQ RECAP format. Specific references to each required site investigation item and its Workplan subsection location can be found in Section 7.1.

LDEQ Comment 5: *Site Ranking System Site ranking shall serve to rank each AOI based upon the urgency of the response action required for the protection of human health and the environment. The RECAP submittal shall contain a site ranking section that includes a recommendation on the appropriate ranking for the AOI and a discussion on the site-specific factors and the criteria used to select the ranking.. . . .*

Comment 5 Response: Laidlaw will include a justification of the site ranking for each AOI in the RECAP submittal as requested. Further discussion of the site ranking methodology for this project is included in Section 6.2.

LDEQ Comment 6: *Criteria for Management Under Management Option 2 Laidlaw should demonstrate to the Department that the AOI meets the below criteria to qualify for management under MO-2 and that a site evaluation has been conducted in accordance with the guidelines in Section 2.3 and 2.4 of RECAP. . . .*

Comment 6 Response: Safety-Kleen will demonstrate to LDEQ that AOI management under MO-2 criteria is appropriate and that the site evaluation has been conducted in accordance with the above-referenced guidelines. Further discussion of the site management criteria for this project is included in Section 6.3.

State of Louisiana

Department of Environmental Quality

M.J. "MIKE" FOSTER, JR.
GOVERNOR

J. DALE GIVENS
SECRETARY

April 29, 1998

CERTIFIED MAIL P 389 278 735
RETURN RECEIPT REQUESTED

Mr. James E. Gallion Sr.
Facility Manager
Laidlaw Environmental Services (Thermal Treatment) Inc.
3763 Highway 471
Colfax, LA 71417

RE: Laidlaw Environmental Services (Thermal Treatment) Inc.
LAD 981 055 791
Workplan RBCA Evaluation Old Burn Area

Dear Mr. Gallion:

The Louisiana Department of Environmental Quality (LDEQ) has completed a review of the Risk Based Corrective Action Workplan, Old Burn Area, dated September 1997. The submittal has been determined to be technically deficient. The technical review deficiencies have been identified and are detailed on the enclosed comments.

If you have any questions or comments, please contact Mr. Tom Harris or Ms. Carolyn Bourn at (504) 765-0272.

Sincerely,

James H. Brent

James H. Brent
Administrator

tfh

Enclosure

COMMENTS
LAIDLAW ENVIRONMENTAL SERVICES INC.
THERMAL TREATMENT FACILITY
LAD 981 055 791
RISK BASED CORRECTIVE ACTION WORKPLAN
OLD BURN AREA

General Comments

The Louisiana Department of Environmental Quality has published and begun the rulemaking process on the April 1998 proposed Risk Evaluation/Corrective Action Program (RECAP). Although the 1998 RECAP document has not yet been promulgated into regulation, the Hazardous Waste Division (HWD) considers RECAP the most appropriate guidance currently available on which to base a risk based corrective action workplan. **The HWD strongly recommends that Laidlaw use the proposed RECAP document as the basis for their workplan.** The American Society for Testing and Materials (ASTM) document which was referenced in your September 1997 workplan was designed as framework for designing a risk-based corrective action program and was never intended as a comprehensive guidance document for performing a risk-based closure.

Potential Surface Soil

Laidlaw should consider potential surface soil in the workplan and in sample collection efforts. Potential surface soil shall be defined as soil present from ground surface to the depth of impact or ground surface to 15 feet below ground surface (bgs) if the depth of impact is greater than 15 feet. Soils present from ground surface to a depth of 15 feet bgs are considered potentially accessible and thus, a potential source of exposure, based on the fact that future intrusive activities at the Area of Investigation (AOI) may result in deeper soils being brought to the surface. A depth of 15 feet was selected as the dividing point between surface and subsurface soil based on considerations of technical practicability for common construction practices. The exposure concentration for potential surface soil shall be the 95%UCL-AM or the highest measured concentration for the delineated AOI. The AOI shall be delineated by comparing the constituent concentration for each sampling location with the respective soil screening standard (SS). All sampling locations having constituent concentrations that exceed the soil SS shall be identified. Based on these identified sampling locations, the horizontal and vertical boundaries of the AOI shall be delineated. For potential surface soil, all data points (including data points with constituent concentrations less than, equal to, or greater than the SS) located on or within the boundaries of the AOI from ground surface to a maximum depth of 15 feet bgs shall be included in the calculation of the exposure concentration unless skewed due to sample bias. The potential surface soil AOI shall be a three dimensional space which contains all data points with constituent concentrations above the soil SS and all points contained within that space whether the concentrations are less than, equal to, or greater than the SS. Sampling locations outside the defined AOI which have constituent concentrations less than the SS shall be eliminated from further consideration.

Submittal Requirements

The Laidlaw workplan submittal should also include:

- Topographic map with AOI labeled and name of quadrangle*;
- Vicinity map with adjoining properties, cross streets and land use*;
- Facility site map with all significant features including the longitude and latitude of the primary facility entrance*;
- A description of land use at and in the vicinity of the AOI;
- Detailed AOI map with longitude, latitude, and all proposed sampling locations*;
- A description of groundwater use at and in the vicinity (1-mile radius) of the AOI including a DOTD well survey obtained within the last 12 months;
- Identification of all known underground utilities (less than 15 feet bgs) within or adjacent to the AOI;
- Identification of the analytical methods and quantitation limits to be used and QA/QC data to be collected; and
- A description of the activities to be conducted at the AOI.

*Note: All maps must have a bar scale, legend, north arrow, contour intervals (if contoured), date data was obtained and map date. Unless otherwise approved by the Department, all maps, figures, diagrams and cross sections submitted must be legible and not larger than 11 inches by 17 inches and must be folded to a standard report format (8.5 inches by 11 inches).

Site Investigation.

The site investigation in the Laidlaw workplan is inadequate. AOI investigation efforts shall include, but not be limited to:

- Identification of the source of the release;
- Characterization of all media suspected of being impacted;
- Identification of the constituents present and their respective concentrations;
- Identification of the horizontal and vertical extent of the impact;
- Identification and characterization of migration pathways and receiving media;
- Characterization of current or potential off-site impacts; and
- Collection of data for modeling input (if any).

Investigation activities shall be performed in accordance with all applicable rules and regulations including the latest versions of the Louisiana Department of Transportation and Development document, "*Water Well Rules, Regulations and Standards, State of Louisiana*" and the Louisiana Department of Environmental Quality and the Department of Transportation and Development document, "*Construction of Geotechnical Boreholes and Groundwater Monitoring Systems.*"

Site Ranking System

Site ranking shall serve to rank each AOI based upon the urgency of the response action required for the protection of human health and the environment. The RECAP submittal shall contain a site ranking section that includes a recommendation on the appropriate ranking for the AOI and a discussion on the site-specific factors and the criteria used to select the ranking. The ranking system is based on the system that is contained in *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites* (ASTM E 1739-95). Each AOI shall be given a site classification ranking of 1, 2, 3, or 4 using the following criteria:

Ranking	Criteria
1	Immediate threat to human health, safety or sensitive environmental receptors;
2	Short-term (0-2 years) threat to human health, safety or sensitive environmental receptors;
3	Long-term (>2 years) threat to human health, safety or sensitive environmental receptors; or
4	No demonstrable long-term threat to human health, safety or sensitive environmental receptors.

A thorough justification of the site ranking shall be included in the RECAP submittal and shall include consideration of all current and future receptors and exposure pathways. Recommendations for interim measures to raise the site ranking shall be included for any AOI with a ranking of 1 or 2.

Criteria for Management Under Management Option 2

Laidlaw should demonstrate to the Department that the AOI meets the below criteria to qualify for management under MO-2 and that a site evaluation has been conducted in accordance with the guidelines in Sections 2.3 and 2.4 of RECAP. If an AOI does not meet all of these criteria, then the LDEQ considers the AOI to be sufficiently complex to warrant a more detailed assessment of risk and the AOI shall be addressed under MO-3.

An AOI that meets all of the following criteria may be managed under MO-2:

- A COC is present, or suspected to be present, only in soil, groundwater, and air [including volatile emissions from soil to the ambient air (which are addressed by the soil RS) and volatile emissions from groundwater to indoor air during household water use (which are addressed by the groundwater RS)]. Constituents are not present in surface water, sediment, or biota. [The MO-2 RS do not address exposure pathways associated with exposure to constituents via surface water, sediments, or biota.];
- A COC(s) is not discharging via groundwater to a surface water body. [The MO-2 RS do not address exposure pathways associated with surface water, sediment, or biota.];
- The impacted soil and/or groundwater under investigation is in declining conditions, i.e., the constituent mass is not increasing, and the source of the release has been mitigated.

[The environmental fate and transport models used to develop the cross-media transfer RS assume that site conditions are in a declining condition.];

- A non-industrial or industrial exposure scenario is under consideration and there are no sensitive subpopulations on or near the AOI. [The MO-2 RS only consider residential and industrial exposure scenarios.];
- There are no other likely human exposure pathways other than the ingestion of soil, the ingestion of groundwater, the inhalation of volatile emissions from soil, the inhalation of particulates from soil, the inhalation of volatile emissions from groundwater, and dermal contact with soil. [The MO-2 RS do not address the ingestion of surface water, the inhalation of volatiles from surface water, dermal contact with surface water, the ingestion of sediment, dermal contact with sediment, the inhalation of volatiles from sediment, or the ingestion of biota (recreational or subsistence fishing and/or fish/shellfish propagation or production; meat or dairy production, agricultural crop production)];
- There are no unusual current or future site conditions that may affect exposure potential at the AOI. [The MO-2 RS do not consider exposure associated with unusual site conditions such as the presence of impacted surface water, sediment, and biota or the presence of NAPL (Note: If NAPL was present at the AOI but has been removed to the extent practicable, the residual concentrations in soil and/or groundwater may be managed under MO-2.)]; and
- If the ecological checklist indicates that the AOI may pose ecological risk, then an ecological risk assessment shall be required in addition to the MO-2 human health assessment.

LAIDLAW
ENVIRONMENTAL
SERVICES INC.

REVISED WORKPLAN
RISK EVALUATION / CORRECTIVE ACTION PROGRAM
OLD BURN AREA

SAFETY-KLEEN (COLFAX), INC.
3763 HIGHWAY 471
COLFAX, LOUISIANA
EPA FACILITY ID NO. LAD 981 055 791

Prepared for:

Safety-Kleen (Colfax), Inc.
Colfax, Louisiana
(318) 627-3443

Prepared by:

The Consulting Services Group of Safety-Kleen
515 West Greens Road, Suite 600
Houston, Texas 77067
(281) 884-7060

Consulting Services Project No. 96513-20-70

November 12, 1998

LAIDLAW ENVIRONMENTAL SERVICES INC.

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LADD CAW
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LAIDLAW ENVIRONMENTAL SERVICES INC.

EXECUTIVE SUMMARY

The Old Burn Area at the Safety-Kleen (Colfax), Inc. (formerly Laidlaw Environmental Services, Inc.) facility was used for the thermal treatment of explosive and reactive wastes from 1985 until 1993. A closure plan was approved for the Old Burn Area by Louisiana Department of Environmental Quality (LDEQ) on November 15, 1995. Closure activities were started in March 1996. As stated in an LDEQ letter dated April 28, 1997, the closure permit was allowed to expire by mutual agreement of Safety-Kleen and LDEQ due to the unreliable nature of soils metal data and to allow investigation of risk-based closure alternatives. LDEQ acknowledged Safety-Kleen's intent to develop a risk-based closure plan in a June 3, 1997 letter and a workplan was submitted to LDEQ in September 1997. A letter received from LDEQ dated April 29, 1998 recommends that the risk-based closure workplan be revised to reflect the April 1998 Proposed LDEQ Risk Evaluation/Corrective Action Program (RECAP) guidance. This revised Workplan addresses these LDEQ recommendations. The objective of this Workplan is to demonstrate how Safety-Kleen proposes to manage the Old Burn Area site under RECAP Management Option 2 (MO-2) through the collection of additional sampling data.

Ten former concrete burn pads and four former storage magazines (used to store explosives prior to thermal treatment) were located within the Old Burn Area. Two surface sampling events were performed during Old Burn Area closure activities in 1996. Three extractable explosive compounds and several metals were identified as constituents of concern. However, when select soil locations were resampled and independently analyzed for metals in May 1996, the metals data from the original analytical laboratory were found to be unreliable. LDEQ approved a request to disregard all previous soils metal data in an October 29, 1996 letter. Groundwater samples were also collected from two open soil borings. Extractable explosive and volatile organic compounds in groundwater were all below their respective detection limits, but six metals were detected.

In this revised Workplan, Safety-Kleen proposes a statistically-based sampling plan for random soil samples at the ten former burn pad locations, along the three natural drainage features crossing the site, and within the Old Burn Area exclusive of the burn pads and drainage areas. Soils at the four former storage magazines will also be resampled. RECAP screening standards calculated for the metals and extractable explosive compounds previously detected in soil and groundwater are cited in this Workplan. The soil results will be compared to the RECAP screening standards for purposes of identifying areas, media or constituents of concern requiring further evaluation under MO-2. The results of the proposed soil sampling will also be used to assess the potential for soils to impact groundwater or surface water.

LAIDLAW ENVIRONMENTAL SERVICES INC.

1.0 INTRODUCTION

This Workplan outlines proposed risk-based data collection and evaluation for the Old Burn Area of the Safety-Kleen (Colfax), Inc. (Safety-Kleen, formerly Laidlaw Environmental Services (Thermal Treatment), Inc.) facility in Colfax, Louisiana (EPA Facility ID Number LAD 981 055 791). This Workplan was previously submitted to Louisiana Department of Environmental Quality (LDEQ) in September 1997. Comments outlining technical deficiencies were received from LDEQ in their letter of April 29, 1998. This revised Workplan addresses these LDEQ comments.

Operations at the Old Burn Area were discontinued in 1993 and closure activities for the Old Burn Area began in 1995. Upon review of analytical data collected during implementation of the original Closure Plan and LDEQ discussion, concurrence was reached to allow the supporting closure permit to expire in May 1997. This was done in order to first identify and perform further site assessment and review risk-based corrective action alternatives. Identifying these revised objectives, the Consulting Services Group of Safety-Kleen (formerly Laidlaw Environmental Services, Inc.) (Consulting Services) has prepared this Workplan on behalf of Safety-Kleen in accordance with the proposed Louisiana Risk Evaluation/Corrective Action Program (RECAP).

The Louisiana Department of Environmental Quality (LDEQ) has published and begun the rulemaking process on the April 1998 proposed RECAP (LDEQ, 1998). This Workplan is based upon the proposed RECAP guidance as published. After completion of the site assessment and evaluation of the results, the proposed RECAP will be used as guidance in developing the corrective action plan.

It is proposed that a statistically-based methodology be used in developing the soil sample collection protocol. EPA guidance and statistically valid practices have been followed in the proposed sampling approach. RECAP Screening Standards for select chemicals of concern have been developed to guide the site assessment, and final RECAP corrective action levels will be developed upon completion of the site assessment evaluation. The RECAP guidelines for the statistical determination of the exposure concentration will be used.

2.0 WORKPLAN SCOPE AND OBJECTIVE

Sites where releases have occurred vary greatly with regard to complexity and the risk that they pose to human health and the environment. The LDEQ RECAP consists of a tiered framework comprised of a Screening Option (SO) and three Management Options (MO). The SO serves to identify those Areas of Investigation (AOIs) requiring further evaluation under a MO. The tiered Management Options allow site evaluation and corrective action efforts to be tailored to site conditions and risks. As the MO level increases, the approach becomes more site-specific and hence, the level of effort required to meet the objectives of the Option increases. The SO and three MOs are summarized below:

- SO - The Screening Option provides LDEQ-derived Screening Standards (SS) for soil and groundwater.
- MO-1 - Management Option 1 provides LDEQ-derived RECAP Standards (RS) for soil and groundwater.
- MO-2 - Management Option 2 provides the option of using site-specific data with specified analytical models to evaluate constituent fate and transport at the AOI.
- MO-3 - Management Option 3 provides the option of using site-specific data for the evaluation of exposure and the evaluation of environmental fate and transport at the AOI.

Since the Old Burn Area AOI is larger than 0.5 acre, and exposure to chemicals in both soil and groundwater is possible due to limitations of previous sampling efforts, management of the Site under Management Option 2 (MO-2) is assumed for purposes of developing this workplan. As directed by LDEQ, Safety-Kleen will demonstrate whether the AOI meets the MO-2 management criteria after conducting an appropriate site assessment. The chosen RECAP Management Option of all or part of this AOI may need to be revised based upon the assessment results. The Old Burn Area is defined as the AOI at this Site.

Based upon previous site characterizations and closure activities, soil data will be collected from the Old Burn Area, ten former burn pad locations within the Old Burn Area, three drainage features crossing the Old Burn Area, and the four former Storage Magazine locations. Eight RCRA metals plus copper and nickel and three extractable explosive parameters have been identified in this Workplan as potential chemicals of concern (COCs) requiring further delineation within the Old Burn Area. Sample collection will focus on potential surface soils. Potential surface soil is defined as soil present from ground surface to the depth of impact or ground surface to 15 feet below ground surface (bgs), if the depth of impact is greater than 15 feet. It should be noted that sandstone outcroppings of the Catahoula Formation have been observed in shallow excavations at the Site, and that unconsolidated soils may not be present below relatively shallow depths the vicinity of the AOI. The need for further groundwater

sample collection will be based upon the soil sample analytical results and the potential for affected soil zones to impact groundwater quality

The Workplan objective is to provide data for conducting the MO-2 evaluation of the Old Burn Area. After review of the previous Closure Plan and associated analytical data, a more complete calculation and application of RECAP Soil Screening Standards prior to the collection of additional data has been proposed. This will allow for a more focused data collection plan. Exposure concentrations for each COC will be based upon appropriate RECAP statistical representation or the highest measured concentration for the delineated AOI. After implementation of this Workplan, a revised Corrective Action Plan will be developed based upon the results of this evaluation and the risk-based screening levels.

3.0 BACKGROUND AND SITE DESCRIPTION

The Safety-Kleen (Colfax), Inc., facility is located at 3763 Highway 471 in Colfax, Louisiana (Figure 1). R&D Fabricating and Manufacturing, Inc. (R&D) originally owned the facility and began the thermal treatment of explosive and reactive wastes in the Old Burn Area in June 1985. The facility has operated since March 1993 under a RCRA Subpart X Permit that allows for the thermal destruction of explosive and reactive wastes. R&D was acquired by Safety-Kleen in July 1993. Waste treatment operations were terminated at the Old Burn Area in 1993 and transferred to the New Burn Area located in the central portion of the property. The final amended Closure Plan for the Old Burn Area was submitted to LDEQ, dated May 1995. Approval of the Closure Plan was granted by LDEQ permit, effective on November 15, 1995, with two permit extension requests granted by LDEQ extending the permit date to May 8, 1997.

The Closure Plan was implemented on December 12, 1995. Results of the closure activities and confirmatory analytical results were summarized in an October 11, 1996 report (ViroGroup, 1996) and submitted for LDEQ review. A letter from the LDEQ was received by Safety-Kleen on October 29, 1996 approving Safety-Kleen's request to disregard previously collected data for metals concentrations in soil. As stated in an LDEQ letter dated April 28, 1997, the closure permit was allowed to expire by mutual agreement of Safety-Kleen and LDEQ due to the unreliable nature of soils metal data and to allow investigation of risk-based closure alternatives. An additional letter received from LDEQ in June 3, 1997 acknowledged Safety-Kleen's intent to develop this risk-based Workplan.

The Safety-Kleen facility includes more than 700 acres of hilly, wooded property located approximately three miles north of the city of Colfax. The facility is surrounded by mostly forested property used as timberland, with one residence outside of the facility's southwest corner (Figure 2). Groundwater use in the vicinity of the AOI was assessed using a recently obtained Louisiana Department of Transportation and Development (DOTD) well survey (Appendix A). Twelve wells were located by this DOTD well survey as being within a one-mile radius of the AOI. All these wells are located outside of the Safety-Kleen facility. Three domestic wells are located along Highway 471 southwest of the facility entrance, ranging from approximately 0.7 to 0.9 miles west from the AOI and all completed in the Catahoula Aquifer. One public supply well is located approximately 0.6 miles to the west of the AOI along Highway 471 and is completed in the Catahoula Aquifer. A second public supply well is located approximately 0.8 miles north of the AOI along Highway 471 and is completed in the Montgomery Aquifer. Four test holes and three monitor wells have also been installed along Highway 471 approximately 0.5 to 0.8 miles west of the AOI, all completed in the Catahoula Aquifer. Groundwater is not used within the property boundaries of the Safety-Kleen facility. The Safety-Kleen facility receives its water supply from the West Grant Water District.

The Old Burn Area is a rectangular-shaped area located on the north-facing slope of a hill, approximately 600 feet long in the north-south direction and approximately 200 feet wide in the east-west direction (Figure 3). The Old Burn Area is approximately 250 feet from the western facility property line. Ten former concrete burn pads were located along a dirt road running along the length of the Site, each approximately ten feet square in size. Four storage magazines were also located along the main facility road between the Old Burn Area and the main entrance to the facility (Figure 4). These storage magazines were constructed of metal exteriors and wood interiors and were used for the storage of explosive materials prior to their thermal treatment at the Old Burn Area. Only one underground utility is located near the AOI, a natural gas pipeline passing approximately 1,000 feet to the northeast.

Elevations across the Old Burn Area range from 176 above mean sea level (MSL) in the southwest corner of the area to 142 feet above MSL in the northeast corner of the area. Most of the topographical relief across the Old Burn Area is a continuous grade from the southwest to the northeast, with the northeast corner being a relatively flat area with less than two feet of relief. Three natural drainage features cross the Old Burn Area. They generally drain from south to north, leading to an intermittent creek along the immediate northeast corner of the Site. This creek flows northwest to Summerfield Branch, which flows northwest to Bayou Grappe and the Red River.

4.0 GEOLOGIC CONDITIONS

This section outlines the general geologic and hydrogeologic features observed at the Safety-Kleen facility during previous studies. The geologic characteristics of the Safety-Kleen facility and the Old Burn Area were derived from the general regional geology and geologic logs from soil borings installed in and near the AOI.

4.1 Regional Geology

The Safety-Kleen facility is located within a belt of consolidated Ordovician sediments stretching southwest to northeast from the Mississippi River to the Sabine River across central Louisiana. More specifically, the facility is located on the Catahoula Formation, which consist of gray to white sandstones, loose quartz sand, tuffaceous sandstone, volcanic ash, and brown sandy clays (petrified wood found locally). This formation is exposed at the surface as a generally hilly terrain, with up to 120 feet of vertical relief across the Safety-Kleen property. Unconsolidated Quaternary sediments deposited by the Red River cut across these Ordovician formations from northwest to southeast at approximately one-half mile to the southwest of the facility.

4.2 Local Geology and Hydrogeology

To characterize the stratigraphy at the Old Burn Area, three soil borings were advanced into the shallow subsurface between April 8-10, 1996 (ViroGroup, 1996). These borings were advanced along the eastern boundary of the Old Burn Area to a depth of 65 to 80 feet below grade (Figure 3). Three general geologic facies were encountered in these borings. In the southern-most and topographically highest soil boring, SB-1, approximately ten feet of the pale orange Catahoula Sandstone is present near the surface. The next 50 feet of stratigraphy in SB-1 and the first 40 and 30 feet in borings WB-2 and WB-1, respectively, consist of consolidated and laterally discontinuous fluvial deposits of clays, silts, and sands. Underlying the fluvial deposits in SB-1 and WB-2 is a consolidated pale yellow sand layer which extends to their total depth. WB-1 contains a 3-foot layer of this consolidated sand underlain to its total depth by fluvial deposits similar to the deposits found higher in the geologic column.

Groundwater is present beneath the Old Burn Area and was encountered in the consolidated sands and silty sands in two of the three soil borings installed in 1996. Groundwater was first encountered at approximately 60 feet below grade in WB-1, and rose to 54 feet below grade within 30 minutes. Groundwater was similarly encountered in WB-2 at 70 feet below grade. Groundwater was not encountered in SB-1 in the total depth of exploration (80 feet below grade). Since monitoring wells were not installed during the closure activities in 1996, a groundwater hydraulic gradient was not determined, but would be expected to be a subdued reflection of the northerly sloping topography

5.0 PREVIOUS SITE INVESTIGATIONS RESULTS

This section summarizes information gathered during previous Site investigations that affected considerations made for this Workplan. The rationale used for determining the chemicals of concern, and a brief summary of soil and groundwater analytical results is presented below.

5.1 Chemicals of Concern

The purpose of this section is to summarize how the chemicals of concern at the facility were selected. The results of several characterization and monitoring investigations performed prior to development of the Closure Plan were used to identify the chemicals of concern for the Closure Plan. Descriptions of these reports as written by ViroGroup in the Closure Plan (ViroGroup, 1995) are given below for reference.

Final Source Characterization Plan *The initial list of chemicals of concern at this facility was addressed in the Final Source Characterization Plan for the R&D Thermal Treatment System (ENSR, 1990). A list of target parameters to be analyzed for was developed through a review of received facility waste streams and regulatory agency concerns. Regulatory agency concerns included the associated long term health effects of those compounds produced as combustion by-products. The parameters targeted for analyses were:*

- *Particulates,*
- *Trace metals (Al, Ba, Cd, Cr, Cu, Ni, Pb, Sb, Se, Zn),*
- *Polycyclic aromatic hydrocarbons (PAHs),*
- *Phenol,*
- *Extractable explosive compounds, and*
- *Volatile organic compounds.*

Final Technical Support Document for the R&D Thermal Treatment System *The Final Technical Support Document for the R&D Thermal Treatment System (ENSR, 1991) notes that phenol, PAHs, Ni, Se, Sb, Cd, ethylbenzene, and total xylene were not detected at or above their respective practical quantitation limits (PQLs).*

January 1991 ETE Soil Sampling *In January 1991, ETE, Inc. collected soil samples around the perimeters of each existing burn unit and analyzed for extractable explosives, volatile organic compounds, and metals. Results showed detectable levels of RDX (Hexhydro-1,3,5-trinitro-1,3,5-triazine) and HMX (Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine), and above-background*

concentrations of eight metals. Review of these results indicated that these parameters should be considered as chemicals of concern at this Site.

Environmental Assessment Report The Environmental Assessment Report (January 1994), Section I, Appendix 1-A contains ash TCLP analytical data (November 1993). This data indicated the presence of metals and volatile organic compounds. No semi-volatile compounds were detected.

Human Health and Ecological Risk Assessment The Human Health and Ecological Risk Assessment, Volume II of the Environmental Assessment Report (ERM, 1993) contained a target list of metals to be evaluated. This list was selected by the EPA in December 1993. The target list included Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn. Metal compounds were considered to be the primary constituents of concern.

Soil Monitoring Plan The Soil Monitoring Plan (ViroGroup 1993) previously implemented at the Safety-Kleen facility lists volatile organic compounds, extractable explosives, and eight RCRA heavy metals as the chemicals of concern. These chemicals were selected based upon the aforementioned studies and discussions.

Closure Plan The Closure Plan added Cu, Ni, V, and Zn to the chemicals of concern listed in the Soil Monitoring Plan. Based upon the results presented in the "Final Technical Support Document for the R&D (Laidlaw) Thermal Treatment System" (ENSR, 1991) and the constituents in the waste streams handled at the facility, soil samples were analyzed for volatile organic compounds, extractable explosives (ten parameters), and total metals (15 parameters).

5.2 Closure Plan

As required by LAC 33:V.3511 and the RCRA Subpart X/HSWA Facility Permit issued to Safety-Kleen, a Closure Plan for the Old Burn Area was submitted (on behalf of Safety-Kleen by ViroGroup, Inc.) to the Louisiana Department of Environmental Quality (LDEQ) in August 1993 (ViroGroup, 1993). LDEQ issued Safety-Kleen a Closure Permit based upon an amended ViroGroup Closure Plan submitted in September 1995, and effective until April 1996 (later extended to May 1997).

Closure activities were initiated by Safety-Kleen on December 12, 1995. The ten concrete burn pads were removed and six inches of underlying soils were excavated from a 20 foot square area centered on each former burn pad location in March 1996. The four storage magazines were also demolished at this time. An initial soil sampling event was conducted on March 27, 1996 to assess whether closure standards for soil had been met. When it was determined that several locations did not meet the closure standards, an additional six inches of soil was removed from former burn pad locations G, H, J, K, and perimeter points 55 and 56 on April 17-22, 1996 (see Figure 3). A second soil sampling -

event was then conducted on April 23, 1996 at locations where additional soil had been removed. For convenience, all soil analytical data from these sampling events are summarized in Table 1.

After the second soil sampling event, questions were raised concerning the validity of the metals data set. Select locations were resampled in May 1996 for independent laboratory analysis. When compared to the results from two other analytical laboratories, soil metal results from the original analytical laboratory were not consistent and therefore did not appear acceptable. Safety-Kleen personnel met with LDEQ representatives in July 1996 to discuss the results of closure activities up to that time, including the validity of the metal analytical results. Following this meeting Safety-Kleen formally requested permission from LDEQ to revise the Soil Monitoring Plan and to disregard all previously submitted soil metal analytical results. Due to this development, Safety-Kleen postponed further remedial work until reliable soil metals data could be obtained from the Old Burn Area. All requested revisions to the Soil Monitoring Plan were approved by LDEQ on October 29, 1996.

5.2.1 Surface Soil Results. Based upon the LDEQ-permitted Closure Plan for the Old Burn Area (ViroGroup, 1995), two surface soil sampling events were performed during closure activities in 1996. A total of 51 soil samples were collected at the Old Burn Area on March 27, 1996 during the initial soil sampling event. Chemical constituent analyses performed were based upon those parameters listed in the Closure Plan and included 48 volatile, 15 total metal, and 11 extractable explosive parameters. Three extractable explosive parameters were detected during this event, HMX at 20 locations, RDX at 17 locations, and 1,3,5-trinitrobenzene at one location (see Table 1). No volatile parameters were detected at any of the soil sampling locations during this event. As approved by the LDEQ in their October 29, 1996 letter, soils metals results from this event are to be disregarded.

During the second soil sampling event, performed after additional soils were excavated from select former burn pad locations (G, H, J, K, and perimeter points 55 and 56), a total of 31 soil samples were collected at the Old Burn Area on April 23, 1996. HMX (9 locations) and RDX (7 locations) were the only extractable explosive parameters detected during this event (see Table 1). Volatile parameters were not analyzed during this event as they had not been detected during the initial soil sampling event. As approved by the LDEQ in their October 29, 1996 letter, soils metals results from this event are also to be disregarded.

5.2.2 Groundwater Results. Based upon the LDEQ-approved Closure Plan for the Old Burn Area (ViroGroup, 1995), groundwater samples were collected from the open soil borings WB-1 and WB-2 prior to their plugging and abandonment (see Figure 3). These samples were analyzed for 15 metals, EPA Method 624 volatile parameters, and 11 extractable explosive parameters. The analytical results are included in the ViroGroup report submitted to the LDEQ (ViroGroup, 1996). Six of the 15 metals were detected above their practical quantitation limits (PQLs). All other metal parameters were below their respective PQLs. The metal results are summarized below.

Total Metals	W-1 (mg/l)	W-2 (mg/l)
Chromium	0.1310	0.352
Zinc	0.4377	0.1513
Barium	0.1075	0.0382
Lead	0.254	0.094
Copper	0.0399	0.0154
Nickel	0.0786	0.0173

All groundwater analytical results for the 48 volatile parameters and 11 extractable explosive parameters were below their respective PQLs.

SS - 0.073
Nickel ?
Lead 0.015

6.0 OVERVIEW OF APPROACH

This section summarizes the proposed LDEQ RECAP document and its approach to risk-based site assessment, evaluation, and management.

6.1 Application of LDEQ RECAP Guidance

The Louisiana Department of Environmental Quality's (LDEQ) Risk Evaluation/Corrective Action Program (RECAP) is a tiered approach for addressing risks to human health and the environment posed by the release of chemicals to the environment. The purpose of RECAP is to identify constituent levels (RECAP Standards) in impacted media that potentially pose unacceptable risks to human health or the environment. A Screening Option is available to determine which areas of a facility, media, or constituents of concern, require further evaluation under one of three Management Options. These Management Options can accommodate varying degrees of site-specificity.

Screening Standards for industrial/commercial land use ($Soil_{SL}$) for three extractable explosive compounds previously detected in surface soils at the Old Burn Area (RDX, HMX, and 1,3,5-trinitrobenzene) are not provided in Table 1 of RECAP (LDEQ, 1998). Therefore, screening standards for soil, groundwater and soil protective of groundwater for RDX, HMX and 1,3,5-trinitrobenzene were developed according to procedures described in Appendix G and Figures 8, 9 and 11 of RECAP (LDEQ, 1998). Previous soil sampling data for extractable explosives are presented in Tables 1A and 1B of this report. No volatile organic compounds were detected in surface soils. Metals were also previously detected in surface soils. However, questions concerning the validity of the metals data led to LDEQ approval (October, 1996) to disregard all previously submitted soil metal analytical results. All new soil samples will be analyzed for the metals listed in Table 2 of this report.

Only one of six metals previously detected in groundwater, lead, was above the GW_{SL} [groundwater screening standard; Table 1 of RECAP (LDEQ, 1998)]. No volatile organic compounds or extractable explosives were detected in groundwater. Groundwater sampling data for metals are presented in Section 5.2.2 of this report.

6.2 RECAP Site Ranking

Site ranking shall serve to rank each AOI based upon the urgency of the response action required for the protection of human health and the environment. The RECAP submittal shall contain a site ranking section that includes a recommendation on the appropriate ranking for the AOI and a discussion on the site-specific factors and the criteria used to select the ranking. The ranking system is based on the system that is contained in the *Standard Guide for Risk-Based Corrective Action Applied*

at Petroleum Release Sites (ASTM E 1739-95). Each AOI shall be given a site classification ranking of 1, 2, 3, or 4 using the following criteria:

Ranking	Criteria
1	Immediate threat to human health, safety or sensitive environmental receptors;
2	Short-term (0-2 years) threat to human health, safety or sensitive environmental receptors;
3	Long-term (>2 years) threat to human health, safety or sensitive environmental receptors;
4	No demonstrable long-term threat to human health, safety or sensitive environmental receptors;

The Old Burn Area AOI will be ranked according to ASTM E 1739-95, as shown in Appendix A of LDEQ RECAP (1998). The ranking will be based on a comparison of the results of the sampling activities proposed in this workplan to MO-2 RECAP Standards, and on the completed ecological checklist.

6.3 Site Management Under Management Option 2

Sites where releases have occurred vary greatly with regard to complexity and the risk that they pose to human health and the environment. The LDEQ RECAP consists of a tiered framework comprised of a Screening Option (SO) and three Management Options (MO). The SO serves to identify those AOI requiring further evaluation under a MO. The tiered Management Options allow site evaluation and corrective action efforts to be tailored to site conditions and risks. As the MO level increases, the approach becomes more site-specific and hence, the level of effort required to meet the objectives of the Option increases.

Since the Old Burn Area AOI is larger than 0.5 acre, and exposure to chemicals in both soil and groundwater is possible due to limitations of previous sampling efforts, management of the Site under Management Option 2 is assumed for purposes of developing this workplan. As directed by LDEQ, Safety-Kleen will demonstrate whether the AOI meets the MO-2 management criteria after conducting an appropriate site assessment. The chosen RECAP Management Option of all or part of this AOI may need to be revised based upon the assessment results. When additional sampling data are available, selection of Management Option 2 will be confirmed.

7.0 PROPOSED RECAP EVALUATION

The proposed risk evaluation of the Area of Investigation (AOI) is summarized in this section. This includes the evaluation, scope, rationale for the selection of constituents of concern (COC) for the AOI, the statistical protocols to be used in determining the extent and sampling rationale of the evaluation, and the proposed data collection locations and methodology.

7.1 Site Investigation Scope

This section outlines the proposed Risk-Based Corrective Action Program (RECAP) site investigation scope. The RECAP site investigation presented in this Workplan will be conducted in accordance with the proposed LDEQ RECAP (April 1998) as well as ASTM RBCA guidance (ASTM, 1995). It is proposed that a statistically-based methodology, based on the 95 percent upper confidence limit on the arithmetic mean (95%UCL-AM) or the highest measured concentration for the delineated AOI, also be used in developing the soil sample collection protocol.

The following scope of work tasks have been identified as part of a tiered AOI investigation effort:

- Identification of the source of the release, **Section 7.2.1**
- Characterization of all media suspected of being impacted, **Section 7.2.2**
- Identification of the constituents present and their respective concentrations, **Section 7.3**
- Identification of the horizontal and vertical extent of the impact, **Section 7.4**
- Identification and characterization of migration pathways and receiving media, **Section 7.4**
- Characterization of current or potential off-site impacts, and **Section 7.5**
- Collection of data for modeling input (if any). **Section 7.5**

Presented below is a discussion of applicable risk-based exposure pathways and the data collection activities for addressing risk-based screening levels. Investigation activities shall be performed in accordance with all applicable rules and regulations including the latest versions of the Louisiana Department of Transportation and Development document *"Water Well Rules, Regulations and Standards, State of Louisiana"* and the Louisiana Department of Environmental Quality and the Department of Transportation and Development document, *"Construction of Geotechnical Boreholes and Groundwater Monitoring Systems."* In order to remain consistent with RECAP guidance, this outlined risk-based evaluation will be applied in an iterative fashion, with soil sample collection and analysis continuing until the goals of this evaluation have been accomplished.

7.2 Source Characterization

Activities to identify the source of the contaminant release and any suspected impacted media are outlined below. The main AOI for this Workplan is the Old Burn Area. This investigation will also confirm whether a release of potential contaminants had previously occurred at the four former storage magazine locations.

7.2.1 Release Source Identification. The Old Burn Area is a rectangular-shaped area located on the north-facing slope of a hill, approximately 600 feet long in the north-south direction and approximately 200 feet wide in the east-west direction (Figure 3). The Old Burn Area is approximately 250 feet from the western facility property line. Previously, ten concrete burn pads were located along a dirt road running along the length of the Site, each approximately ten feet square in size. The thermal destruction of explosive and reactive wastes was performed in open concrete burners located in the center of the burn pads. Combustion by-products (gas, vapors, and ash) were released to the atmosphere during waste treatment. The burn pads are the source of release within the Old Burn Area AOI. They were removed along with associated soil in March and April 1996.

Four storage magazines were also located along the main facility road between the Old Burn Area and the main entrance to the facility (Figure 4). These storage magazines were constructed of metal exteriors and wood interiors and were used for the storage of explosive materials prior to their thermal treatment at the Old Burn Area. These locations are being evaluated under this Workplan, but no release of contaminants at these locations have been observed or indicated. They were removed in March 1996.

7.2.2 Impacted Media Characterization. The media impacted by contaminant release at the Old Burn Area AOI are potential surface soils. For this Workplan, potential surface soil will be defined as soil present from ground surface to the depth of impact or ground surface to 15 feet below ground surface (BGS) if the depth of impact is greater than 15 feet. Soils present from ground surface to a potential depth of 15 feet bgs are considered potentially accessible and thus, a potential source of exposure. These soils accessibility is based on the fact that future intrusive activities (construction, utilities work, etc.) at the AOI may result in deeper soils being brought to the surface. It should be noted that sandstone outcroppings of the Catahoula Formation have been observed in shallow excavations at the Site, and that unconsolidated soils may not be present below relatively shallow depths across the Site. If a contaminant release is detected, potential surface soils may also have been impacted at the former storage magazine AOIs.

At this time, all other media are believed not to have been impacted by the Old Burn Area AOI contaminant release. This includes groundwater, surface water, sediment, and biota. The results of this investigation will be used to assess whether the impacted potential surface soil has in turn impacted

these other media. If the potential for such an impact to other media is determined under the RECAP guidelines, additional assessment investigation will be performed to address RECAP requirements.

7.3 Constituents of Concern Identification

Three classes of contaminants were previously identified as Constituents of Concern (COCs) for the Old Burn Area; volatile organic compounds, extractable explosives, and metals. Referencing previous investigations, selected chemicals are proposed for elimination as COCs based on low to undetected concentrations and detection frequencies. The rationale for the proposed selection of COCs from each chemical class are outlined below.

Volatile Organic Compounds The list of waste codes treated at the Old Burn Area is attached as Appendix B. Previous soil sampling results for the Old Burn Area did not indicate the presence of volatile organic compounds above their respective detection limits. Based upon the list provided in Appendix B and the previous results of soil sampling in the Old Burn Area, volatile organic compounds will be eliminated from the list of COCs.

Extractable Explosive Compounds The list of waste codes treated at the Old Burn Area is attached as Appendix B. Previous soil sampling results for the Old Burn Area are detailed in Section 5.2.1 of this report. Based upon the list provided in Appendix B and the previous results of soil sampling in the Old Burn Area, all extractable explosive compounds except for HMX and RDX will be eliminated from the list of COCs. In addition, 1,3,5-trinitrobenzene will be sampled for vertical extent below Pad H of the Old Burn Area. This is the only location where this compound was previously detected above its PQL. Subsequently, approximately six inches to one foot of soil was removed from beneath Pad H. Otherwise this compound has already been eliminated as a COC from the other areas by the soil sampling program performed under the previous Closure Plan (see Table 1 of the Closure Plan).

Metals The list of waste codes treated at the Old Burn Area are attached as Appendix B. Previous soil sampling results from the Old Burn Area have been considered invalid by Safety-Kleen and the LDEQ. Based upon the list provided in Appendix B and the lack of valid metals data for the Old Burn Area, metals analysis will be performed for the 8 RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), copper and nickel.

7.4 Definition of the Area of Investigation (AOI)

Investigation of potential surface soils shall focus on defining AOIs within the Old Burn Area. An AOI is defined as a contiguous zone of an impacted media that is defined vertically and horizontally by the presence of a constituent concentration which exceeds the appropriate Screening Standard.

7.4.1 Identification of the Impact Extent. The following section contains a description of the statistical rationale to be used in soil sampling of the Old Burn Area and the preliminary soil screening levels to be applied to the soil analytical results. The areas to be sampled are those relating to previous activities within the Old Burn Area AOI. Included are the permitted area of the Old Burn Area, former burn pad locations, and the drainage features crossing and exiting the Old Burn Area. The four former storage magazine locations will also be sampled based upon previous activities and analytical results.

A statistically-based sampling and analysis plan will be employed to evaluate the impact of previous activities at the Old Burn Area. The EPA's Methods for Evaluating the Attainment of Cleanup Standards, Volume 1: Soils and Solid Media (U.S. EPA, 1989c) was used for guidance in developing this plan. In accordance with this document, the Old Burn Area will be divided into distinct sampling areas such that the sampling areas "are as homogeneous as possible with respect to prior waste management activities." The RECAP document also states that, at an AOI where the COC is unevenly distributed, it may be appropriate to divide the AOI into multiple exposure areas and evaluate each exposure area separately. The appropriateness of whether to evaluate each exposure area separately or combine areas together will be reviewed upon assessment of the RECAP Workplan analytical results.

The Screening Standards (SS) will be used to determine if the AOI warrants further evaluation under a Management Option (MO). If the source concentrations detected at the AOI are less than or equal to the SS, then typically, the AOI shall not require further evaluation or action under a MO. The SS can also be used to screen out areas of a facility, media or COCs that do not warrant further evaluation or action under a MO.

The sampling areas proposed for the permitted Old Burn Area include 1) four sections of the area within the permitted Old Burn Area boundaries excluding ten former burn pad locations and drainage features, 2) each of the ten former burn pad locations, and 3) the drainage features crossing and exiting the Old Burn Area (see Figure 5). Each area will be sampled and analyzed independently. The four storage magazine locations will be treated as unique sampling areas, however, the overall approach to assessing the impact to these areas will differ from the other areas as outlined in the following sections.

With the exception of the four storage magazine locations, sample locations within each area or area section will be selected using a random sampling approach. Random sample selection should result in unbiased estimations of the population being analyzed, provided contrary trends or patterns do not exist

within the population (Gilbert, 1987). The assumption, that such trends do not exist within each population, is justified by dividing the Site into distinct sampling areas based upon site features and use.

The vertical extent of contamination within each sampling area will be determined by sampling at incremental depths below ground surface at each randomly selected sampling location (Table 4). The depths at which samples are collected will be considered layers within the sampling areas. Each layer will be an independent population and analyzed as such. Therefore, a statistical analysis will be performed on the data from each layer to determine the extent of vertical impact within a sampling area.

The statistical evaluation, that will be performed to determine the nature of impact to each sampling area, will follow the guidelines outlined in Section 2.8 of the proposed RECAP document. The 95 percent upper confidence limit on the arithmetic mean (95%UCL-AM) or the highest measured concentration for the delineated AOI will be used as the exposure concentration. The distribution of data will be determined within each layer of a given sampling area. Appropriate transformations of the data will then be performed, if necessary, to adhere to assumptions of the underlying statistical analysis.

7.4.2 Sampling Locations and Protocol. A brief description of the sampling areas and the manner in which sample locations will be determined within each area is provided in the following sections. Safety-Kleen will collect soil samples at the Old Burn Area and storage magazines based upon statistical methodology appropriate for each location type. Each COC will be delineated horizontally and/or vertically until concentrations below the COC's respective surface soil screening level are encountered. Comparison of the extractable explosives Soil Screening Standards to the results of the perimeter sampling conducted as part of implementation of the Closure Plan supports limiting sampling to within the Old Burn Area at this time.

Old Burn Area The area within the permitted Old Burn Area boundaries surrounding the former burn pad locations and the drainage features (Old Burn Area) will be analyzed independently from the former burn pads and drainage features. Surface soil types or soil homogeneity may vary across the Old Burn Area where multiple contaminant processing and transport mechanisms are thought to be present (direct release, thermal oxidation to air, stormwater runoff). Since the potential impact from contaminant pathways differs when compared to the former burn pads and drainage features, the permitted Old Burn Area will be assessed separately. Due to site-specific features (former burn pad locations, prevailing wind directions, and flow within drainage features), the Old Burn Area will be divided into four sampling areas or sections (Figure 5). This was done in an attempt to define relatively homogeneous regions of the Old Burn Area with respect to the degree in which a region was potentially impacted. These sections were defined to separate the areas on either side of the pads from each other and to separate the uphill areas from the downhill areas. Results from each section will be analyzed independent of the results of each of the remaining individual sections.

Eight sample locations will be randomly located within each section. To provide adequate sample coverage throughout sections and to ensure that the data is not spatially biased, the sample locations will be identified using randomly selected points within a grid system imposed over each section. Each section will be divided into a four cell-by-six cell grid (Figure 5). Eight of the 24 grid cells within a section will be randomly selected for sampling. If a selected grid cell contains portions of a former burn pad location or drainage feature in at least 25 percent of the area within the grid cell, the grid cell will be discarded, and a new grid cell will be randomly selected from the remaining grid cells. This selection process ensures that the sample collected is representative of the Old Burn Area and not of the former burn pads or drainage features. Random local coordinates will be generated for each selected grid cell using a random number generator. A total of 8 soil sample locations will be identified. All random selections will be performed using a random number generator.

A total of 32 soil sample locations (eight sample locations within each of the four sections) will be identified in the area surrounding the ten former burn pad locations. The previously sampled perimeter points will not be resampled as these points are biased in location and could not be properly used with the statistically-based analysis described.

Former Burn Pad Locations Each burn pad location will be treated as an independent sampling area. The burn pad locations cannot be sampled and analyzed as a single entity because of heterogeneities that may exist between burn pad location use and excavation histories. Because the potential for impact due to previous activities at the Site is greatest at the former burn pad locations, the sample location density will be greater than in the adjacent areas described above. Eight sample locations will be identified within each former burn pad location. Due to the relatively small size of the former burn pad locations, simple random sampling will be employed to select sample locations. Eight sets of random local coordinates will be generated for each former burn pad location using a random number generator. A total of 80 soil sample locations (eight sample locations within each of the ten former burn pad locations) will be identified.

Drainage Features The three main drainage features at the Old Burn Area will be divided into seven segments 200 feet in length (see Figure 6), and each segment then subdivided into ten 20-foot intervals. One interval in each segment is to be chosen randomly for soil sample collection. A total of seven samples will be collected in a manner appropriate for use with suitable statistical methods designed for linear features (i.e., Latin Hypercube, etc.). Two areas of soil washout found along the drainage features will also be included in the drainage feature soil sampling. Eight sample locations will be identified within each washout area. Due to the relatively small size of the washout areas, simple random sampling will be employed to select sample locations. Eight sets of random local coordinates will be generated for each washout area using a random number generator. A total of 16 soil sample locations (eight sample locations within each of the two washout areas) will be identified.

Storage Magazines Storage magazine soil samples will be collected at the previous soil sampling locations, at the entrance to each of the four former storage magazines. Based on past results, four additional storage magazine #4 locations will be sampled for extractable explosive analysis, located ten feet from each former storage magazine wall.

Sampling Protocol The soil samples will be sent via overnight courier under chain-of-custody documentation for analysis to the selected analytical laboratory. Each sample will be analyzed using analytical methods and practical quantitation limits as specified in Tables 2 and 4. The metal parameters will be analyzed using EPA Method 6010 (Method 7471 for mercury), and the extractable explosive parameters will be analyzed using EPA Method 8330. Equipment and trip blanks will be included for each day of soil sampling activities.

All soil samples will be collected, stored, and shipped according to Safety-Kleen standard operating procedures and quality assurance/quality control (QA/QC) protocol (Appendix C). Soil sampling activities will be documented in a bound log book. A site-specific Health and Safety Plan will also be developed prior to the start of any field activities.

7.5 Risk Evaluation

Once all required soil sampling and analysis has been completed, a risk-based evaluation following RECAP guidelines will be performed. This process will consider the characterization of and degree of off-site impact and the potential for additional data collection and modeling. The Old Burn Area AOI will be ranked according to the LDEQ RECAP site ranking example previously described. The potential to use fate and transport modeling to supplement the RECAP evaluation does exist for this Site, but may not be employed if not deemed appropriate. Representative geotechnical and Synthetic Precipitation Leaching Procedure (SPLP) soil samples collected from each sampling area may also be used for environmental fate and transport analyses under MO-2 and MO-3 (see Table 4).

The RECAP Ecological Checklist will be used to assess if a screening-level ecological risk assessment (ERA) is warranted. This checklist is comprised of questions concerning onsite and off-site land uses, characteristics of the environmental setting, the extent of migration, and potential impacts to ecological receptors and/or their habitat. If it is determined from the completed checklist that no significant ecological impacts are occurring or could occur, then no further evaluation shall be required. If it is determined that ecological impacts are occurring or could occur in the future, then a screening-level ERA (Tier 1) will be performed for the Old Burn Area AOI.

8.0 REFERENCES

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TABLES

TABLE 1
EXTRACTABLE EXPLOSIVE ANALYTICAL SUMMARY
PREVIOUS CLOSURE ACTIVITIES - INITIAL SAMPLING EVENT (March 27, 1996)
OLD BURN AREA - SAFETY-KLEEN FACILITY, COLFAX, LOUISIANA

Location / PARAMETERS	S51	S52	S53	S54	S55	S56	S57	S58	S59	S60
HMX	< 0.185	< 0.186	< 0.189	< 0.189	< 0.197	**0.678**	< 0.195	< 0.192	< 0.197	< 0.199
RDX	< 0.179	< 0.180	< 0.183	< 0.183	< 0.190	< 0.183	< 0.188	< 0.186	< 0.191	< 0.193
1,3,5-Trinitrobenzene	< 0.090	< 0.090	< 0.092	< 0.092	< 0.096	< 0.092	< 0.095	< 0.094	< 0.096	< 0.097
1,3-Dinitrobenzene	< 0.087	< 0.087	< 0.089	< 0.089	< 0.092	< 0.089	< 0.091	< 0.090	< 0.092	< 0.093
Tetryl	< 0.102	< 0.103	< 0.104	< 0.104	< 0.108	< 0.104	< 0.107	< 0.106	< 0.109	< 0.110
Nitrobenzene	< 0.093	< 0.093	< 0.095	< 0.095	< 0.098	< 0.095	< 0.098	< 0.096	< 0.099	< 0.100
2,4,6-Trinitrotoluene	< 0.090	< 0.091	< 0.093	< 0.092	< 0.096	< 0.093	< 0.095	< 0.094	< 0.096	< 0.098
4-Amino-2,6-Dinitrotoluene	< 0.086	< 0.087	< 0.089	< 0.088	< 0.092	< 0.089	< 0.091	< 0.090	< 0.092	< 0.093
2,Amino-4,6-Dinit-Toluene	< 0.084	< 0.084	< 0.086	< 0.086	< 0.089	< 0.086	< 0.088	< 0.087	< 0.089	< 0.090
2,4-Dinitrotoluene	< 0.082	< 0.082	< 0.084	< 0.084	< 0.087	< 0.084	< 0.086	< 0.085	< 0.087	< 0.088
2,6-Dinitrotoluene	< 0.166	< 0.167	< 0.170	< 0.170	< 0.177	< 0.170	< 0.175	< 0.173	< 0.177	< 0.179

Location / PARAMETERS	S61	S62	S63	S63B (S63 Dup.)	S64	S65	S66	S67	S68	S69
HMX	**0.203**	**2.47**	**1.54**	**0.753**	< 0.185	< 0.210	**0.310**	< 0.181	< 0.181	< 0.183
RDX	< 0.194	**0.418**	< 0.188	< 0.183	< 0.179	< 0.203	**0.465**	< 0.175	< 0.175	< 0.177
1,3,5-Trinitrobenzene	< 0.097	< 0.089	< 0.094	< 0.092	< 0.090	< 0.102	< 0.096	< 0.088	< 0.088	< 0.089
1,3-Dinitrobenzene	< 0.094	< 0.085	< 0.091	< 0.089	< 0.087	< 0.098	< 0.093	< 0.085	< 0.085	< 0.086
Tetryl	< 0.110	< 0.100	< 0.107	< 0.104	< 0.102	< 0.116	< 0.109	< 0.100	< 0.100	< 0.101
Nitrobenzene	< 0.100	< 0.091	< 0.097	< 0.095	< 0.093	< 0.105	< 0.099	< 0.091	< 0.091	< 0.092
2,4,6-Trinitrotoluene	< 0.098	< 0.089	< 0.095	< 0.092	< 0.091	< 0.103	< 0.097	< 0.089	< 0.088	< 0.089
4-Amino-2,6-Dinitrotoluene	< 0.093	< 0.085	< 0.091	< 0.088	< 0.086	< 0.098	< 0.092	< 0.085	< 0.084	< 0.085
2,Amino-4,6-Dinit-Toluene	< 0.091	< 0.083	< 0.088	< 0.086	< 0.084	< 0.095	< 0.090	< 0.082	< 0.082	< 0.083
2,4-Dinitrotoluene	< 0.089	< 0.081	< 0.086	< 0.084	< 0.082	< 0.093	< 0.087	< 0.080	< 0.080	< 0.081
2,6-Dinitrotoluene	< 0.180	< 0.164	< 0.175	< 0.068	< 0.166	< 0.189	< 0.250	< 0.163	< 0.162	< 0.165

Notes:
All data given in milligrams per kilogram (mg/kg).
Locations 67 through 70 are Storage Magazines 1 through 4 respectively.
Locations S"A" through S"K" are former Burn Pads A through K.
See Figure 3 for sample locations, samples collected along excavation six inches below grade.

TABLE 1
EXTRACTABLE EXPLOSIVE ANALYTICAL SUMMARY
PREVIOUS CLOSURE ACTIVITIES - INITIAL SAMPLING EVENT (March 27, 1996)
OLD BURN AREA - SAFETY-KLEEN FACILITY, COLFAX, LOUISIANA

Location / PARAMETERS	S70	SA2	SA3	SA4	SB1	SB2	SB3	SC1	SC2	SC4
HMX	**0.598**	< 0.183	< 0.182	**3.96**	< 0.185	**8.34**	**0.852**	< 0.183	< 0.186	< 0.185
RDX	**0.292**	< 0.177	< 0.177	**0.187**	< 0.179	**0.912**	**0.223**	< 0.177	**0.199**	< 0.179
1,3,5-Trinitrobenzene	< 0.090	< 0.089	< 0.089	< 0.089	< 0.090	< 0.090	< 0.089	< 0.089	< 0.091	< 0.090
1,3-Dinitrobenzene	< 0.087	< 0.086	< 0.086	< 0.085	< 0.087	< 0.087	< 0.086	< 0.086	< 0.087	< 0.087
Tetryl	< 0.102	< 0.101	< 0.101	< 0.100	< 0.102	< 0.103	< 0.101	< 0.101	< 0.103	< 0.102
Nitrobenzene	< 0.093	< 0.092	< 0.091	< 0.091	< 0.093	< 0.093	< 0.092	< 0.092	< 0.093	< 0.093
2,4,6-Trinitrotoluene	< 0.090	< 0.090	< 0.089	< 0.089	< 0.090	< 0.091	< 0.090	< 0.090	< 0.091	< 0.091
4-Amino-2,6-Dinitrotoluene	< 0.086	< 0.086	< 0.085	< 0.085	< 0.086	< 0.087	< 0.086	< 0.086	< 0.087	< 0.086
2,Amino-4,6-Dinit-Toluene	< 0.084	< 0.083	< 0.083	< 0.083	< 0.084	< 0.084	< 0.083	< 0.083	< 0.085	< 0.084
2,4-Dinitrotoluene	< 0.082	< 0.081	< 0.081	< 0.081	< 0.082	< 0.082	< 0.081	< 0.081	< 0.083	< 0.082
2,6-Dinitrotoluene	< 0.166	< 0.165	< 0.164	< 0.164	< 0.166	< 0.167	< 0.17	< 0.165	< 0.168	< 0.166

Location / PARAMETERS	SD1	SD2	SD4	SE2	SE3	SE4	SF2	SF3	SF4	SG2
HMX	**0.703**	**7.24**	**1.73**	< 0.187	**0.305**	< 0.188	< 0.182	< 0.183	**0.489**	< 0.186
RDX	**0.305**	**0.830**	**0.205**	< 0.181	**0.796**	< 0.182	< 0.177	< 0.177	< 0.177	< 0.180
1,3,5-Trinitrobenzene	< 0.092	< 0.092	< 0.091	< 0.091	< 0.090	< 0.091	< 0.089	< 0.089	< 0.089	< 0.090
1,3-Dinitrobenzene	< 0.089	< 0.088	< 0.088	< 0.088	< 0.087	< 0.088	< 0.086	< 0.086	< 0.086	< 0.087
Tetryl	< 0.104	< 0.104	< 0.104	< 0.103	< 0.102	< 0.104	< 0.101	< 0.101	< 0.101	< 0.102
Nitrobenzene	< 0.095	< 0.095	< 0.094	< 0.094	< 0.093	< 0.094	< 0.091	< 0.092	< 0.091	< 0.093
2,4,6-Trinitrotoluene	< 0.092	< 0.092	< 0.092	< 0.092	< 0.091	< 0.092	< 0.089	< 0.089	< 0.089	< 0.091
4-Amino-2,6-Dinitrotoluene	< 0.088	< 0.088	< 0.088	< 0.087	< 0.087	< 0.088	< 0.085	< 0.085	< 0.085	< 0.087
2,Amino-4,6-Dinit-Toluene	< 0.086	< 0.086	< 0.085	< 0.085	< 0.084	< 0.085	< 0.083	< 0.083	< 0.083	< 0.084
2,4-Dinitrotoluene	< 0.084	< 0.084	< 0.083	< 0.083	< 0.082	< 0.083	< 0.081	< 0.081	< 0.081	< 0.082
2,6-Dinitrotoluene	< 0.170	< 0.170	< 0.169	< 0.168	< 0.167	< 0.169	< 0.164	< 0.164	< 0.164	< 0.067

Notes:
All data given in milligrams per kilogram (mg/kg).
Locations 67 through 70 are Storage Magazines 1 through 4 respectively.
Locations S"A" through S"K" are former Burn Pads A through K.
See Figure 3 for sample locations, samples collected along excavation six inches below grade.

TABLE 1
EXTRACTABLE EXPLOSIVE ANALYTICAL SUMMARY
PREVIOUS CLOSURE ACTIVITIES - INITIAL SAMPLING EVENT (March 27, 1996)
OLD BURN AREA - SAFETY-KLEEN FACILITY, COLFAX, LOUISIANA

Location / PARAMETERS	SG3	SG4	SH1	SH2	SH4	SJ1	SJ3	SJ4	SK2	SK3
HMX	**0.510**	**1.15**	**4.220**	**2.47**	< 0.182	**0.591**	< 0.185	**1.09**	< 0.192	**1.53**
RDX	**0.212**	**0.855**	**6.19**	**1.84**	**0.347**	< 0.182	< 0.179	**0.570**	< 0.186	**1.81**
1,3,5-Trinitrobenzene	< 0.092	< 0.090	< 0.089	**0.166**	< 0.089	< 0.092	< 0.090	< 0.091	< 0.093	< 0.092
1,3-Dinitrobenzene	< 0.088	< 0.087	< 0.086	< 0.086	< 0.085	< 0.088	< 0.087	< 0.088	< 0.090	< 0.089
Tetryl	< 0.104	< 0.102	< 0.101	< 0.102	< 0.101	< 0.104	< 0.102	< 0.104	< 0.106	< 0.105
Nitrobenzene	< 0.094	< 0.093	< 0.092	< 0.092	< 0.091	< 0.094	< 0.093	< 0.094	< 0.096	< 0.095
2,4,6-Trinitrotoluene	< 0.092	< 0.091	< 0.090	< 0.090	< 0.089	< 0.092	< 0.091	< 0.092	< 0.094	< 0.093
4-Amino-2,6-Dinitrotoluene	< 0.088	< 0.087	< 0.086	< 0.086	< 0.085	< 0.088	< 0.087	< 0.088	< 0.090	< 0.089
2,Amino-4,6-Dinit-Toluene	< 0.086	< 0.084	< 0.083	< 0.084	< 0.083	< 0.085	< 0.084	< 0.085	< 0.087	< 0.086
2,4-Dinitrotoluene	< 0.084	< 0.082	< 0.081	< 0.082	< 0.081	< 0.083	< 0.082	< 0.083	< 0.085	< 0.084
2,6-Dinitrotoluene	< 0.170	< 0.167	< 0.066	< 0.066	< 0.066	< 0.068	< 0.067	< 0.068	< 0.069	< 0.068

Location / PARAMETERS	SK4
HMX	< 0.196
RDX	< 0.190
1,3,5-Trinitrobenzene	< 0.095
1,3-Dinitrobenzene	< 0.092
Tetryl	< 0.108
Nitrobenzene	< 0.098
2,4,6-Trinitrotoluene	< 0.096
4-Amino-2,6-Dinitrotoluene	< 0.092
2,Amino-4,6-Dinit-Toluene	< 0.089
2,4-Dinitrotoluene	< 0.087
2,6-Dinitrotoluene	< 0.070

Notes:
All data given in milligrams per kilogram (mg/kg).
Locations 67 through 70 are Storage Magazines 1 through 4 respectively.
Locations S"A" through S"K" are former Burn Pads A through K.
See Figure 3 for sample locations, samples collected along excavation six inches below grade.

TABLE 1
EXTRACTABLE EXPLOSIVE ANALYTICAL SUMMARY
PREVIOUS CLOSURE ACTIVITIES - SECOND SAMPLING EVENT (April 23, 1996)
OLD BURN AREA - SAFETY-KLEEN FACILITY, COLFAX, LOUISIANA

Location / PARAMETERS	S561	S562	S563	S564	S565	SG1	SG2	SG3	SG4	SG5
HMX	< 0.189	< 0.189	< 0.189	< 0.189	< 0.189	< 0.185	< 0.183	**0.633**	< 0.181	< 0.181
RDX	< 0.183	< 0.183	< 0.183	< 0.183	< 0.18	< 0.179	< 0.177	**0.186**	< 0.175	< 0.175
1,3,5-Trinitrobenzene	< 0.092	< 0.092	< 0.092	< 0.092	< 0.092	< 0.090	< 0.089	< 0.089	< 0.088	< 0.088
1,3-Dinitrobenzene	< 0.089	< 0.089	< 0.088	< 0.089	< 0.089	< 0.087	< 0.086	< 0.086	< 0.085	< 0.085
Tetryl	< 0.104	< 0.104	< 0.104	< 0.104	< 0.140	< 0.102	< 0.101	< 0.101	< 0.100	< 0.100
Nitrobenzene	< 0.095	< 0.095	< 0.095	< 0.095	< 0.095	< 0.093	< 0.092	< 0.092	< 0.090	< 0.091
2,4,6-Trinitrotoluene	< 0.093	< 0.092	< 0.092	< 0.092	< 0.092	< 0.091	< 0.090	< 0.090	< 0.088	< 0.089
4-Amino-2,6-Dinitrotoluene	< 0.088	< 0.088	< 0.088	< 0.088	< 0.088	< 0.087	< 0.086	< 0.086	< 0.084	< 0.085
2,Amino-4,6-Dinit-Toluene	< 0.086	< 0.086	< 0.086	< 0.086	< 0.086	< 0.084	< 0.083	< 0.083	< 0.082	< 0.082
2,4-Dinitrotoluene	< 0.084	< 0.084	< 0.084	< 0.084	< 0.084	< 0.082	< 0.081	< 0.081	< 0.080	< 0.080
2,6-Dinitrotoluene	< 0.170	< 0.170	< 0.170	< 0.170	< 0.170	< 0.167	< 0.165	< 0.165	< 0.162	< 0.163

Location / PARAMETERS	SH1	SH2	SH3	SH4	SH5	SH5A (SH5 Dup.)	SJ1	SJ2	SJ3	SJ4
HMX	**0.392**	< 0.179	< 0.180	< 0.183	**1.04**	**1.24**	**0.712**	**150**	< 0.180	**0.376**
RDX	**0.427**	< 0.174	< 0.174	< 0.177	**0.494**	**0.540**	< 0.177	**1.84**	< 0.174	**0.713**
1,3,5-Trinitrobenzene	< 0.088	< 0.087	< 0.088	< 0.089	< 0.089	< 0.088	< 0.089	< 0.088	< 0.088	< 0.090
1,3-Dinitrobenzene	< 0.085	< 0.084	< 0.085	< 0.086	< 0.085	< 0.085	< 0.086	< 0.085	< 0.084	< 0.086
Tetryl	< 0.100	< 0.099	< 0.099	< 0.101	< 0.100	< 0.100	< 0.101	< 0.100	< 0.099	< 0.102
Nitrobenzene	< 0.090	< 0.090	< 0.090	< 0.092	< 0.091	< 0.091	< 0.092	< 0.091	< 0.090	< 0.092
2,4,6-Trinitrotoluene	< 0.088	< 0.088	< 0.088	< 0.089	< 0.089	< 0.089	< 0.090	< 0.089	< 0.088	< 0.090
4-Amino-2,6-Dinitrotoluene	< 0.084	< 0.084	< 0.084	< 0.085	< 0.085	< 0.085	< 0.086	< 0.085	< 0.084	< 0.086
2,Amino-4,6-Dinit-Toluene	< 0.082	< 0.081	< 0.082	< 0.083	< 0.083	< 0.083	< 0.083	< 0.083	< 0.082	< 0.084
2,4-Dinitrotoluene	< 0.080	< 0.080	< 0.080	< 0.081	< 0.081	< 0.081	< 0.081	< 0.081	< 0.080	< 0.082
2,6-Dinitrotoluene	< 0.162	< 0.161	< 0.162	< 0.164	< 0.164	< 0.164	< 0.165	< 0.164	< 0.162	< 0.166

Notes:
All data given in milligrams per kilogram (mg/kg).
Locations S"A" through S"K" are former Burn Pads A through K.
See Figure 3 for sample locations, samples collected along excavation six inches below grade.

TABLE 1
EXTRACTABLE EXPLOSIVE ANALYTICAL SUMMARY
PREVIOUS CLOSURE ACTIVITIES - SECOND SAMPLING EVENT (April 23, 1996)
OLD BURN AREA - SAFETY-KLEEN FACILITY, COLFAX, LOUISIANA

Location / PARAMETERS	SJ5	SK1	SK2	SK3	SK4	SK5
HMX	< 0.182	**0.244**	**0.604**	< 0.19	**0.303**	< 0.188
RDX	< 0.176	**0.211**	< 0.18	< 0.180	**0.249**	< 0.182
1,3,5-Trinitrobenzene	< 0.088	< 0.091	< 0.092	< 0.091	< 0.091	< 0.091
1,3-Dinitrobenzene	< 0.085	< 0.088	< 0.089	< 0.087	< 0.088	< 0.088
Tetryl	< 0.100	< 0.103	< 0.104	< 0.103	< 0.103	< 0.103
Nitrobenzene	< 0.091	< 0.094	< 0.095	< 0.093	< 0.094	< 0.094
2,4,6-Trinitrotoluene	< 0.089	< 0.091	< 0.092	< 0.091	< 0.091	< 0.091
4-Amino-2,6-Dinitrotoluene	< 0.085	< 0.087	< 0.088	< 0.087	< 0.087	< 0.087
2,Amino-4,6-Dinit-Toluene	< 0.082	< 0.085	< 0.086	< 0.084	< 0.085	< 0.085
2,4-Dinitrotoluene	< 0.080	< 0.083	< 0.084	< 0.082	< 0.083	< 0.083
2,6-Dinitrotoluene	< 0.163	< 0.168	< 0.170	< 0.167	< 0.168	< 0.168

Notes:
All data given in milligrams per kilogram (mg/kg).
Locations S"A" through S"K" are former Burn Pads A through K.
See Figure 3 for sample locations, samples collected along excavation six inches below grade.

TABLE 2
SOIL SCREENING STANDARD SUMMARY
OLD BURN AREA, SAFETY-KLEEN FACILITY
COLFAX, LOUISIANA

PARAMETERS	ANAYTICAL METHOD	PRACTICAL QUANTITATION LIMIT (mg/kg)	SOIL SCREENING LEVEL (mg/kg) (Soils, 0-15ft., Soil_Sli = industrial exposure	SOIL TO GW SCREENING LEVEL (mg/kg) (Soils, 0-15 ft., Soil_SLi= industrial exposure)	GW SCREENING LEVEL (mg/L)
Extractable Explosives*					
HMX	SW 846 8330	0.07	10,217	0.9	0.18
RDX	SW 846 8330	0.1	19	0.011	6.6E-04
1,3,5-Trinitrobenzene	SW 846 8330	0.08	6,130	2.15	0.11
Metals					
Arsenic	SW 846 6010	5.0	2.3	100	0.05
Barium	SW 846 6010	1.0	12,000	2,000	2
Cadmium	SW 846 6010	0.25	85	20	0.005
Chromium (III)	SW 846 6010	1.0	170,000	100	3.7
Chromium (VI)	SW 846 6010	1.0	850	100	37
Copper	SW 846 6010	1.0	600,000	1,500	1.3
Lead	SW 846 6010	2.0	1,700	100	0.015
Mercury	SW 846 7471	0.040	51	4	0.002
Nickel	SW 846 6010	1.0	3,400	200	0.1
Selenium	SW 846 6010	5.0	850	20	0.05
Silver	SW 846 6010	0.50	850	100	0.018

Note: See Table 3 for RECAP Screening Level Calculation parameters for these compounds.

TABLE 3
INPUT PARAMETER, RECAP SCREENING LEVEL CALCULATIONS
OLD BURN AREA, SAFETY-KLEEN FACILITY
COLFAX, LOUISIANA

PARAMETER	RDX	HMX	TRINITRO BENZENE
Log Koc (L/kg)	1.8 (1)	0.54 (2)	1.88 (3)
Henry's Law Constant (atm-m3/mol)	1.2E-05 (1)	2.6E-15 (2)	3.08E-09 (3)
Solubility (mg/L)	39 (1)	6.6 (2)	3,500 (3)
Oral Slope Factor	1.0E-01 (4)	N/A (5)	N/A (6)
Oral Reference Dose	3.0E-03 (4)	5.0E-02 (5)	3.0E-02 (6)

N/A - Not Applicable
1 - ATSDR, 1995a, Toxicological Profile for RDX
2 - ATSDR, 1997, Toxicological Profile for HMX
3 - ATSDR, 1995b, Toxicological Profile for Di- & Trinitrobenzene
4 - U.S. EPA, 1998, IRIS, RDX
5 - U.S. EPA, 1998, IRIS, HMX
6 - U.S. EPA, 1998, IRIS, Trinitrobenzene

TABLE 4
SOIL SAMPLING METHODOLOGY AND PARAMETERS
OLD BURN AREA, SAFETY-KLEEN FACILITY
COLFAX, LOUISIANA

AREA	REF. FIGURE	SOIL SAMPLING METHOD			PARAMETERS
		TOTAL DEPTH	SAMPLE TYPE	LOCATION	
Old Burn Area	#5	15 Ft.*	- Continuous Sampling - 1 ft. each sample - Grab	- Statistically determined (See Section 7.6.2) - See grid pattern, Fig. #5	- Eight total RCRA metals + copper and nickel - Two extractable explosives - One representative geotechnical and SPLP sample**
Former Burn Pad Locations	#5	15 Ft.*	- Continuous Sampling - 1 ft. each sample - Grab	- Statistically determined (See Section 7.6.2) - Vertical delineation only	- Eight total RCRA metals + copper and nickel - Two extractable explosives - 1,3,5-Trinitrobenzene (extr. explo.) at Pad H only (Detected at Pad H 3/27/96) - One representative geotechnical and SPLP sample**
Drainage Features	#6	6 In.	- Use available sediment - Grab	-Three drainage features, divided into seven 200-ft. long segments (Fig #6) - Each segment divided into ten 20-ft. long intervals - Select one interval from each segment using random number generator (7 samples total) - Eight samples to be collected from each washout area, selected using random number generator	- Eight total RCRA metals + copper and nickel - Two extractable explosives - One representative geotechnical and SPLP sample**
Storage Magazines	#4	15 Ft.*	- Continuous Sampling - 1 ft. each sample - Grab	- Use previous locations (at entrance to four former storage magazines) - At Storage Mag. #4, four new locations ten feet from each wall to be sampled for HMX and RDX at a minimum (HMX and RDX detected at S.M.#4, 3/27/96)	- Eight total RCRA metals + copper and nickel - Two extractable explosives at storage magazine #4 only - One representative geotechnical and SPLP sample**

Notes:
* - Total soil sample collection depth will be to 15 feet or until consolidated material is encountered (Catahoula Formation, sandstone).
** - Geotechnical soil characteristics to be analyzed, but may not be limited to: soil type, dry bulk density, soil organic carbon, total porosity, volumetric water content, hydraulic conductivity, grain size, and soil pH. Samples will be sequentially analyzed in the laboratory, scheduled so that all extraction and holding times are met.
The selected total metal parameters are as follows: arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver.
The selected extractable explosive parameters are as follows: HMX and RDX.
SPLP - Synthetic Precipitation Leaching Procedure.

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FIGURES

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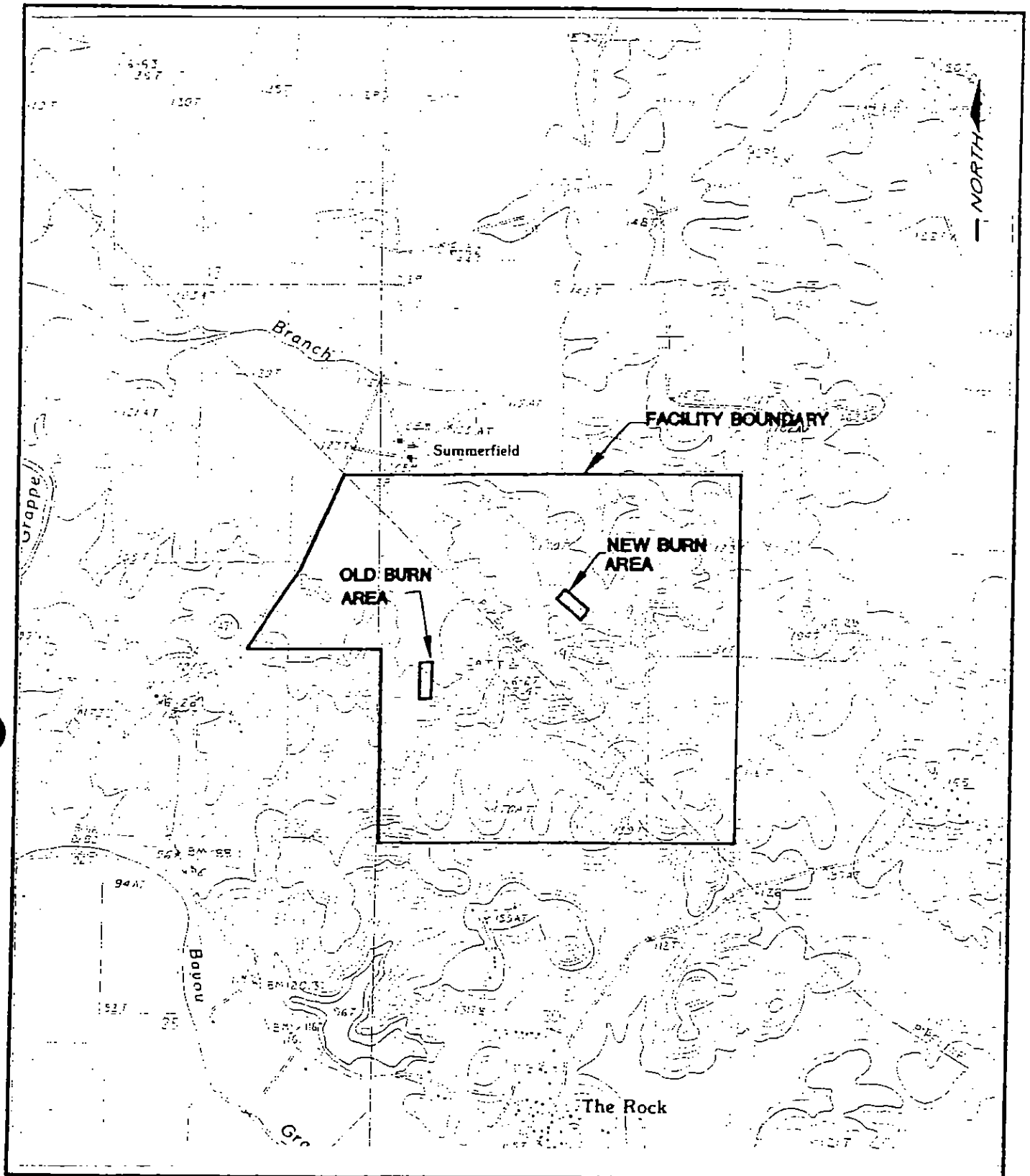


0 2000
FEET

Quadrangle location

NORTH

Modified from USGS Colfax, Louisiana Quadrangle, 1993

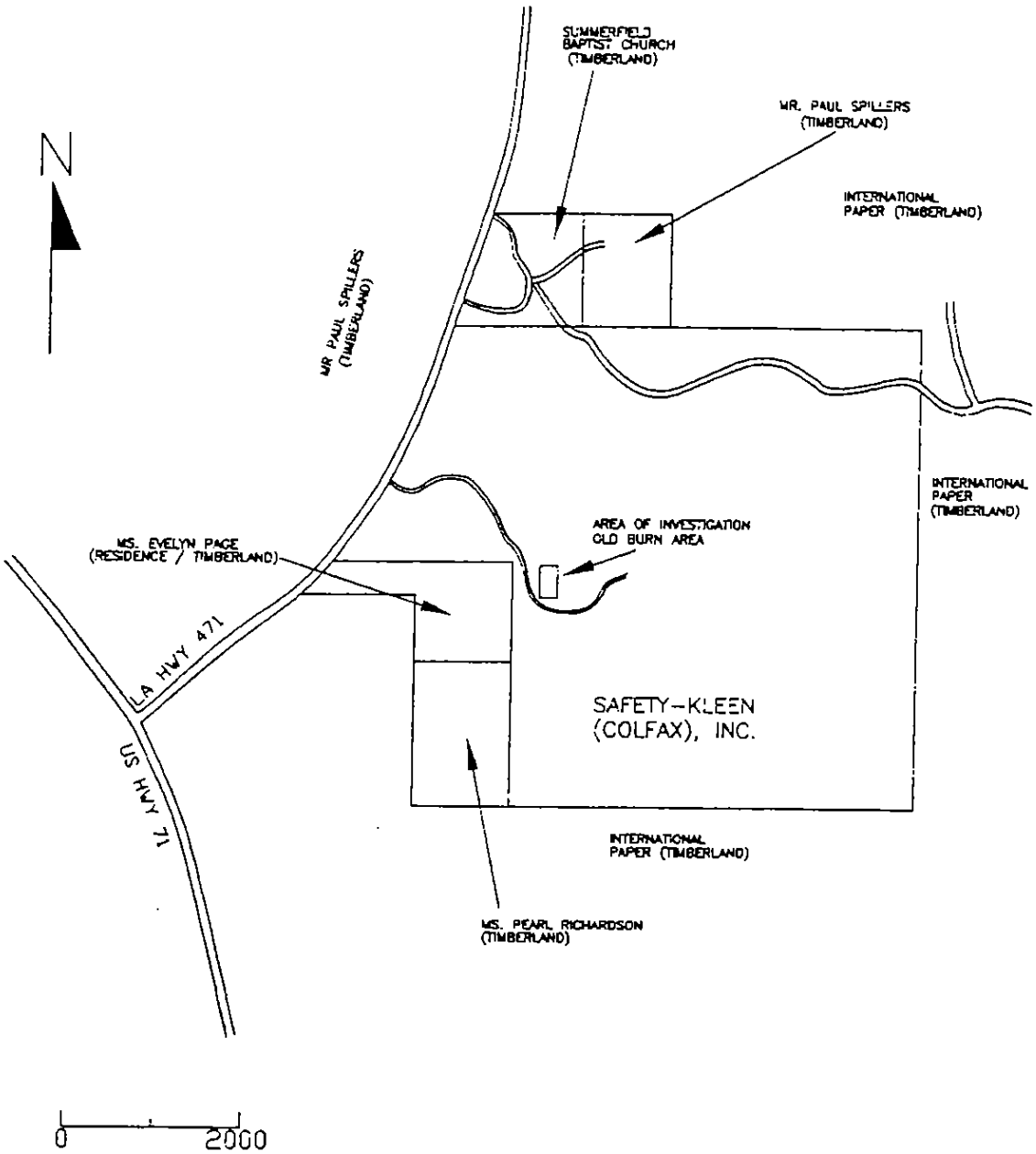
LAIDLAW ENVIRONMENTAL SERVICES

FIGURE 1

SITE LOCATION MAP
SAFETY-KLEEN (COLFAX), INC
COLFAX, LOUISIANA

DRAWN/DATE	APPROVED/DATE
DG 7/98	7/98

ENVIRONMENTAL.DWG/TIFF 1=1 7/29/98



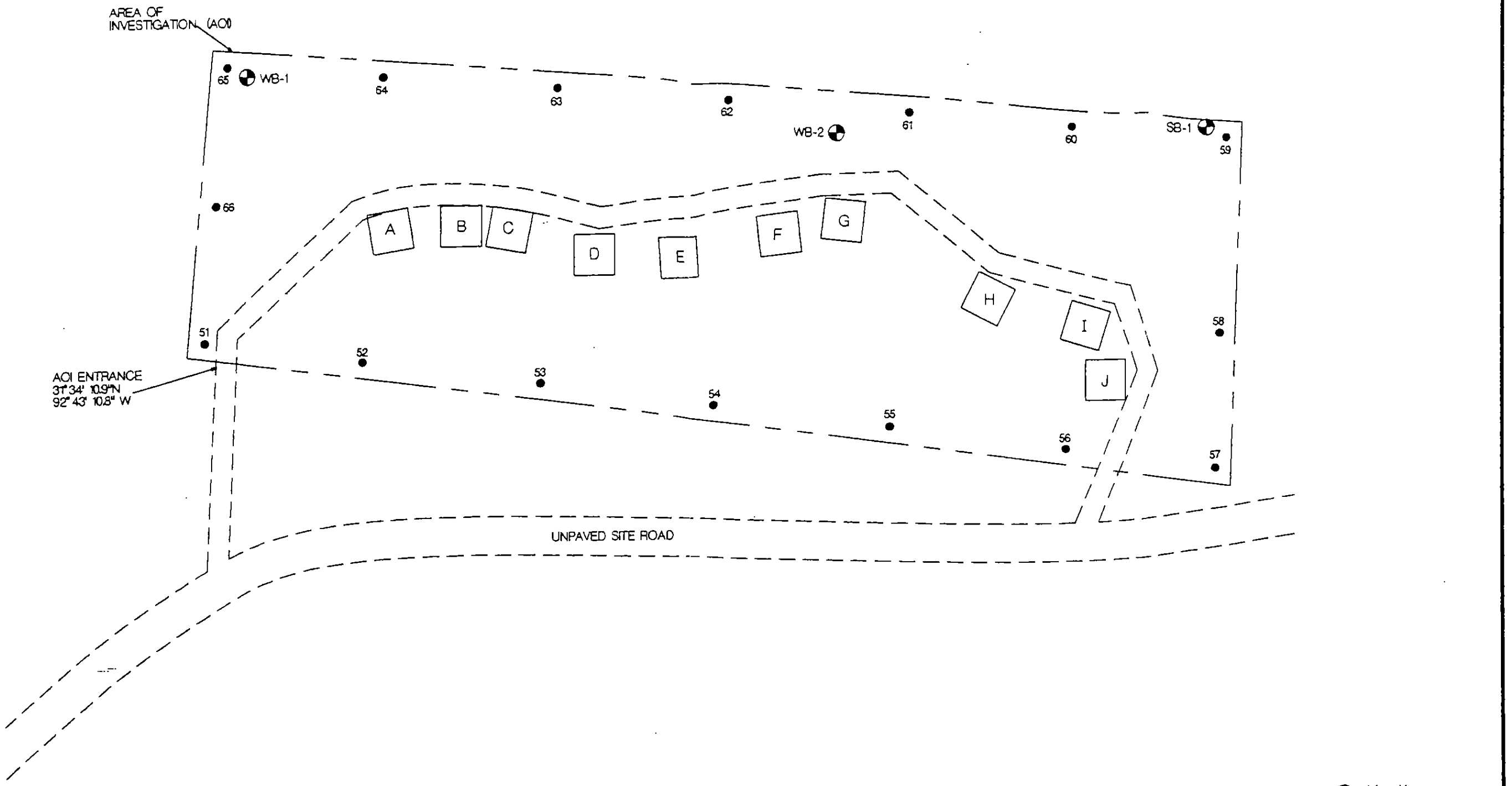
NORTH

LAIDLAW ENVIRONMENTAL SERVICES

FIGURE 2

VICINITY MAP
SAFETY-KLEEN (COLFAX), INC
COLFAX, LOUISIANA

DRAWN/DATE	APPROVED/DATE
DG 7/98	7/98



LEGEND

- OLD BURN AREA BOUNDARY
- A — FORMER BURN PAD
- PERIMETER POINT
- SOIL BORING

Modified from Land Survey, Stephen B. Gremillion
Registered Louisiana Surveyor

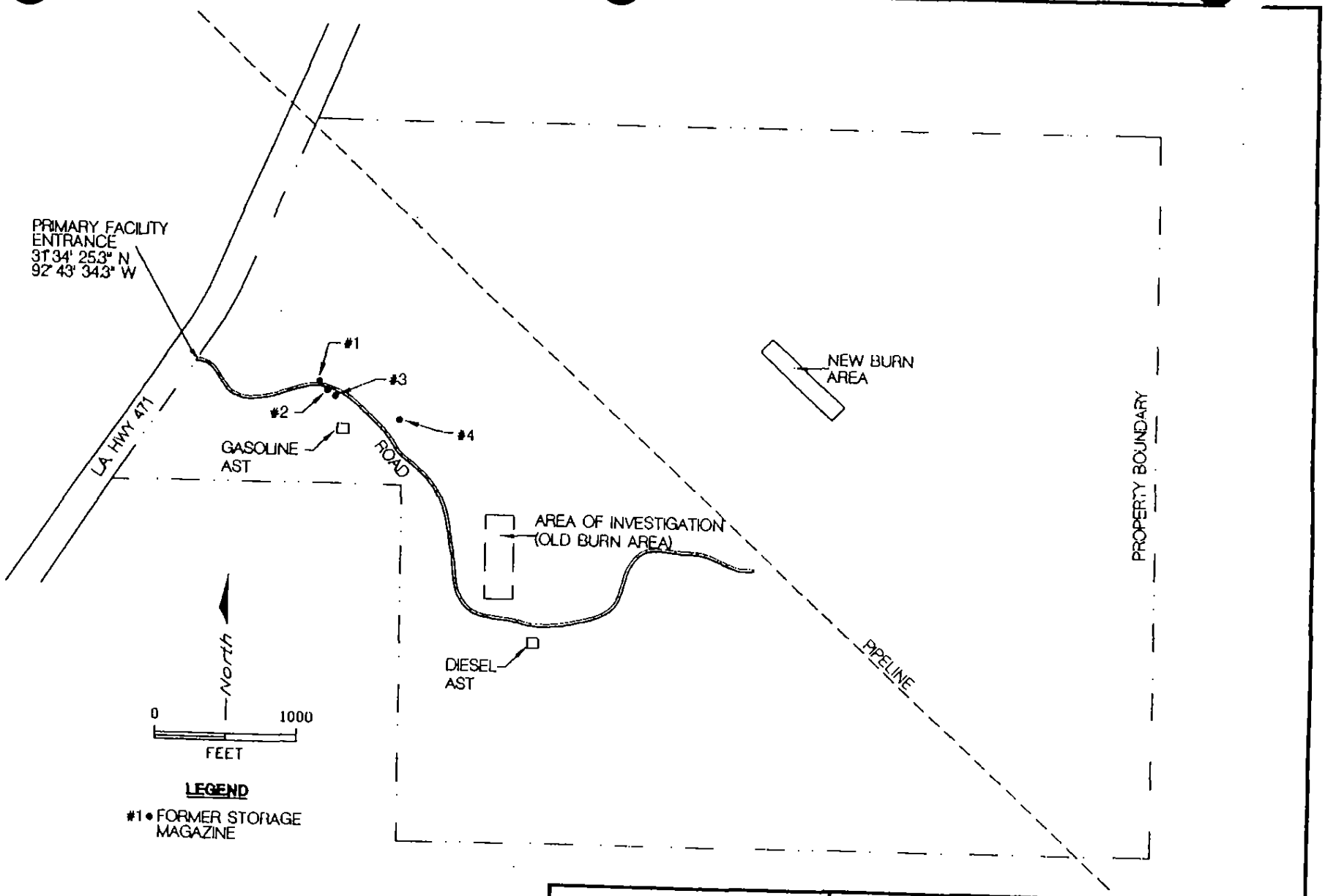
	BY	DATE
DRAWN	DJG	7/28/98
CHECKED		
APPROVED		
APPROVED		
APPROVED		

LAIDLAW ENVIRONMENTAL SERVICES

FIGURE 3
SITE PLAN - OLD BURN AREA
SAFETY-KLEEN (COLFAX), INC.
COLFAX, LOUISIANA

SCALE: 1" = 50' | DWG. NO: 96513-02

I:\ENV\96513\20\60\96513-02.WB.RF (PCP=FIG2) 1=50 7\28\97



Modified from Land Survey, Stephen B. Gremillion
Registered Louisiana Surveyor

LAIDLAW ENVIRONMENTAL SERVICES

FIGURE 4

FACILITY MAP, STORAGE MAGAZINE LOCATIONS
SAFETY-KLEEN (COLFAX), INC.
COLFAX, LOUISIANA

SCALE	DATE
1" = 1000'	7/28/98

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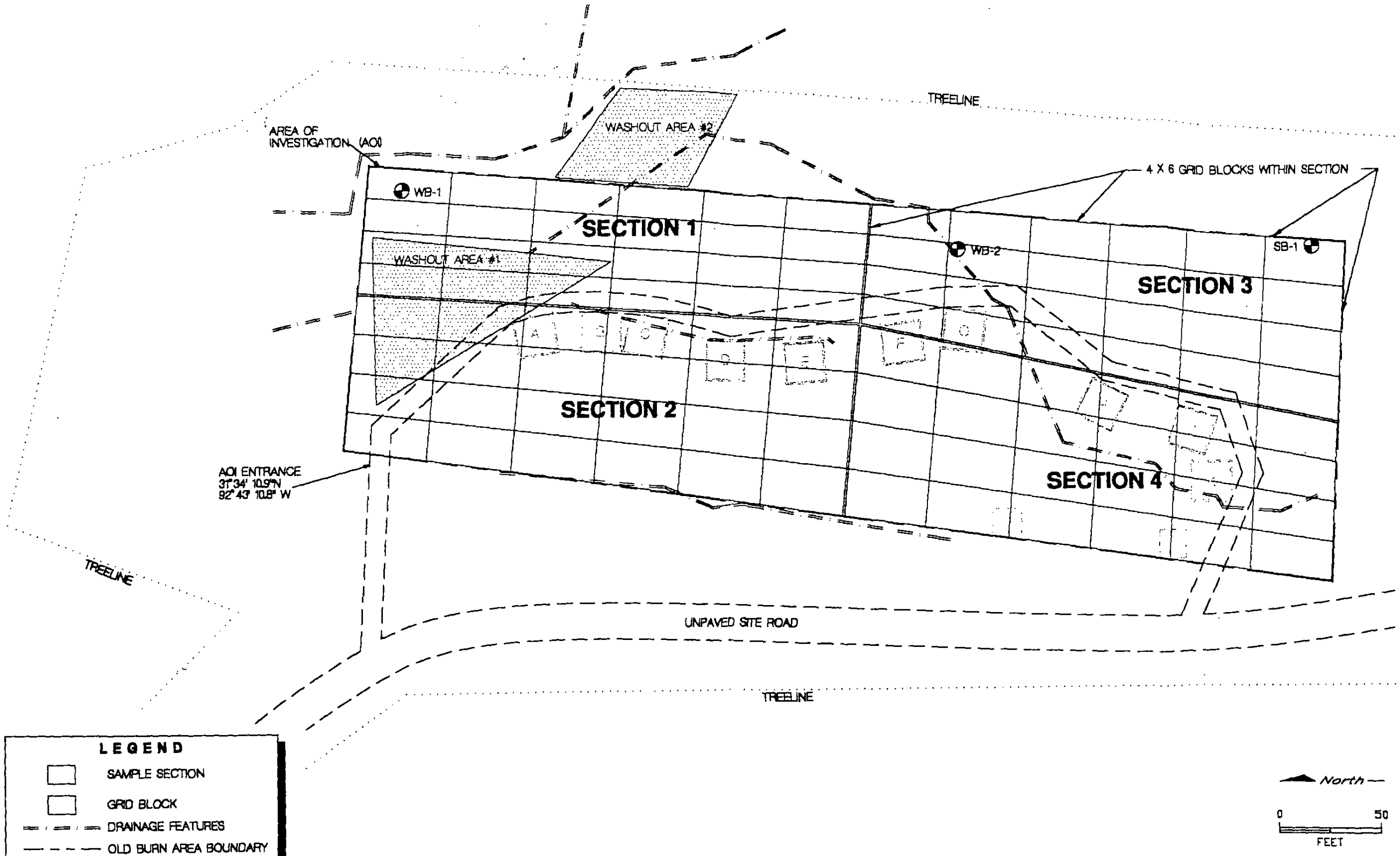

Modified from Land Survey, Stephen B. Gremillion
Registered Louisiana Surveyor

	BY	DATE
DRAWN	DJG	7/28/98
CHECKED		
APPROVED		
APPROVED		
APPROVED		

LAIDLAW ENVIRONMENTAL SERVICES

FIGURE 5
PROPOSED SAMPLING LOCATIONS
OLD BURN AREA - SAFETY-KLEEN (COLFAX), INC.
COLFAX, LOUISIANA

SCALE: 1" = 50' | DWG. NO: 96513-04

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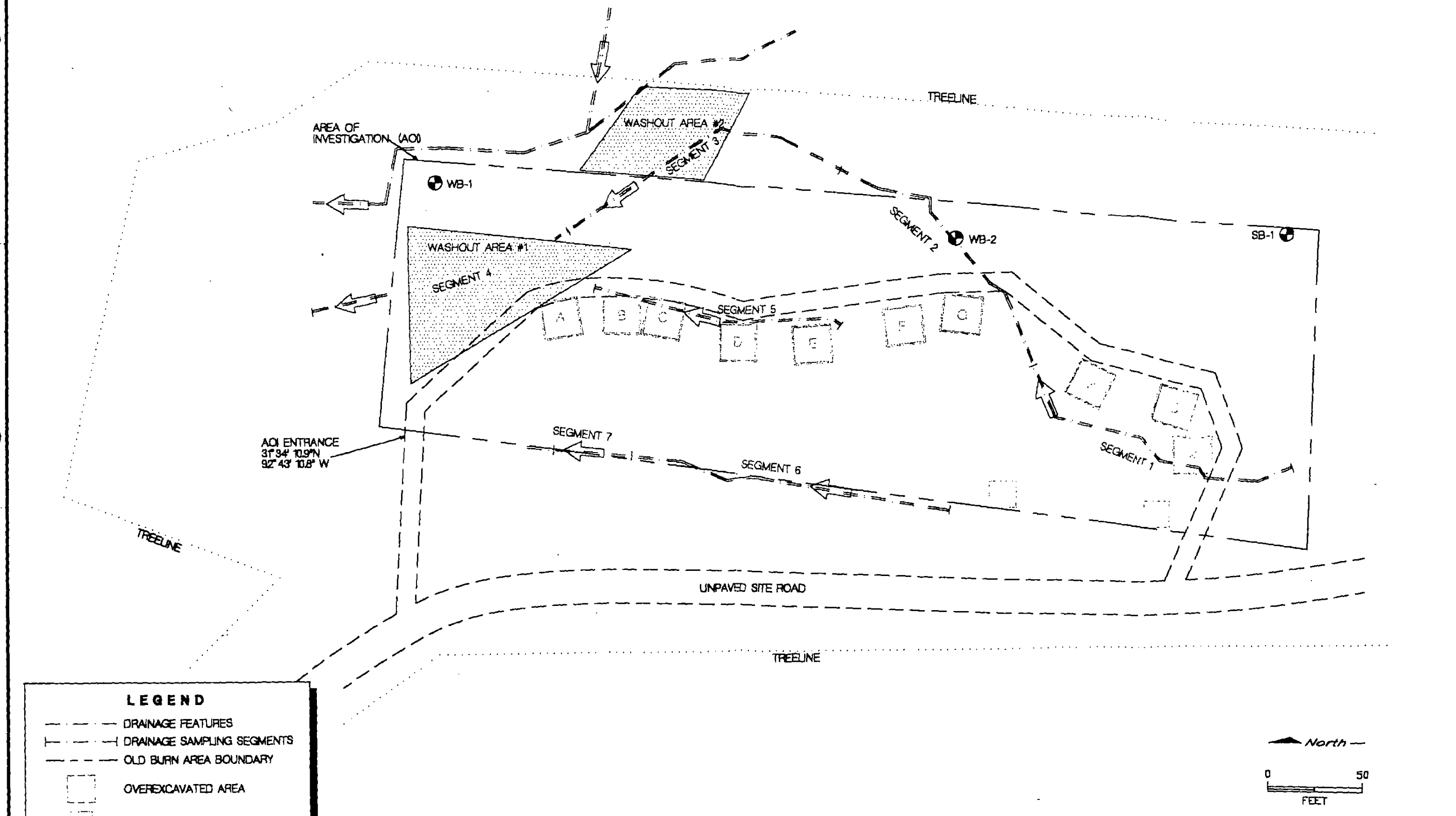

Modified from Land Survey, Stephen B. Gremillion
Registered Louisiana Surveyor

BY	DATE
DJG	7/28/98

LAIDLAW ENVIRONMENTAL SERVICES

FIGURE 6
PROPOSED DRAINAGE FEATURE SAMPLING LOCATIONS
OLD BURN AREA - SAFETY-KLEEN (COLFAX), INC.
COLFAX, LOUISIANA

SCALE 1" = 50' | DWG. NO: 96513-03

K:\ENVI\96513\20\60\96513-03.WB.RF 1=50 7/28/98.

ENVIRONMENTAL
SERVICES INC.

APPENDIX A

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
WELL SURVEY

STATE OF LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
P.O. Box 94245
Baton Rouge, Louisiana 70804-9245

M. J. "MIKE" FOSTER, JR.
GOVERNOR

Water Resources Section
(504) 379-1434

FRANK M. DENTON
SECRETARY

July 29, 1998

Mr. Michael J. Wisniowiecki
Laidlaw Environmental Services, Inc.
515 West Greens Road, Suite 600
Houston TX 77067

Re: Computerized
Water Well Plot
Your Request of: July 24, 1998

Dear Mr. Wisniowiecki:

As per your request, we are herewith enclosing the following for your information:

1. A computer plot showing the location of registered water wells for the subject area.

2. Computer printout listing registered water wells and pertinent information about the wells.

3. An explanation of the codes used on the printout.

Please be advised that this plot does not include every possible water well which may have been drilled within the referenced coordinates. The plot depicts only those wells which have been registered with this Department, including those scheduled by the U.S. Geological Survey, and does not include those which are presently being processed. It should also be noted that when a group of wells have identical latitude and longitude, only the first registered well (sequential number 1) is depicted on the plot.

This information is made available through our cooperative water resources program with the U.S. Geological Survey.

If we may be of any further assistance, please do not hesitate to contact me or Ms. Buffy Brinkley of this office, at (504) 379-1434.

Very truly yours,

Z. Bolourchi

Zahir "Bo" Bolourchi, P.E.
Chief, Water Resources Section

ZB:rmd
Enclosures: (3)
c:\#wp\plot.lst

DOTD'S USE AND SUB-USE COMPUTER CODES FOR WATER WELLS AND HOLES

	WELL USE	SUB-USE	
A	Any Use	- A	Abandoned
		- D	Destroyed
		E X	Excavated Out
		- I	Inactive/Standby
		P A	Plugged
B	Borehole/Pilot Hole	- -	
C	Cathodic	- -	
D	Dewatering	- -	
E	Power Generation	- -	
H	Domestic	- -	
I	Irrigation	- -	
		- Q	Aquaculture
		- S	Stock
L	Heat Pump	H H	Hole
		H S	Supply Well
M	Monitor	- -	
N	Industrial	2 0	Food and kindred products
		2 2	Textile mill products
		2 4	Lumber & wood products
		2 6	Paper & allied products
		2 8	Chemicals & allied products
		2 9	Petroleum refining and related industries
		3 3	Primary metal industries
		9 9	Other
O	Observation	- O	Multiple Purpose
		- Q	Water Quality
		- W	Water Level
P	Public Supply	- C	Commercial
		- M	Therapeutic
		- P	Municipal
		- R	Rural
		- T	Institution/Government
		- Z	Other
R	Recovery	- -	
S	Rig Supply	- -	
T	Test Hole	- -	
W	Piezometer	- -	
Z	Other	- F	Fire Protection
		- R	Reworked
		- U	Unknown
		- Z	Other

ZB:mql
03/11/94
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LOUISIANA DEPARTMENT OF ORTATION AND DEVELOPMENT

BATON ROUGE

WELL4011 LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

DATE 07/28/98 WATER WELL PLOT PLOT NUMBER 1

PLOT OF REGISTERED WELLS, GRANT PARISH (7 1/2 QUAD SCALE)
REFERENCE LATITUDE= 313230 REFERENCE LONGITUDE= 924500
SCALE= 2.6400 (INCH/MILE)
CONSTANT= 68.8900 (MILE/DEGREE LATITUDE)

*****PLOT BY THE FOLLOWING INFORMATION*****

PARISHES 043
WELL USES ALL
WITHIN A 1.0000 MILE RADIUS OF LATITUDE 313411 LONGITUDE 924311

* WELLS LIE WITHIN AN AREA BOUNDED BY:
MAX LATITUDE= 313504 MAX LONGITUDE= 924413
MIN LATITUDE= 313318 MIN LONGITUDE= 924209

****PLOTTED WELLS*****

ST	PARISH	WELL-NO	IDENTIFICATION	OWNER'S NAME	DEPTH	USE	DATE	OWNER'S NUM	AQUIFER	AVL-INFO		X	Y
22	043	63	313404 924403 1	ETHRIDGE, E A	35	H--	0739		122CTHL		W	2.45	4.75
22	043	233	313407 924401 1	WAMPLER, ALLEN	90	H--	1958		122CTHL	Q		2.54	4.90
22	043	259	313408 924355 1	LA PUBLIC WORKS	127	TPA	1969	TEST#1	122CTHL	DM		2.80	4.95
22	043	260	313407 924354 1	WAMPLER, ALLEN	70	H--	1958		122CTHL	Q		2.84	4.90
22	043	297	313412 924345 1	U S GEOL SURVEY	93	TPA	0971		112OONWM	D		3.23	5.15
22	043	364	313407 924355 1	WEST GRANT WTR	95	I-A	1973		122CTHL	E	W	2.80	4.90
22	043	365	313407 924355 2	WEST GRANT WTR	68	T-A	1973		122CTHL		W	2.80	4.80
22	043	392	313452 924317 1	WEST GRANT WTR	46	P-R	1073	NO 2	112MGMR	D Q	W	4.43	7.17
22	043	393	313412 924346 1	WEST GRANT WTR	75	P-R	1073	NO 3	122CTHL	Q	W	3.19	5.15
22	043	5127Z	313403 924357 1	R & D	134	M--	0693	PGI-MW-1	122CTHL	D	W	2.71	4.70
22	043	5128Z	313403 924357 2	R & D	40	M--	0793	PGI-MW-2	122CTHL	D	W	2.71	4.70
22	043	5129Z	313403 924357 3	R & D	53	M--	0793	PGI-MW-3	122CTHL	D	W	2.71	4.70

*****NUMBER OF WELLS PLOTTED= 12 *****

BATON ROUGE

7/28/88

LOUISIANA DOTD - WATER WELL REGISTRATION SYSTEM PAGE 1
WELLRQ1A - REGISTERED WATER WELLS IN GRANT -- SORTED BY WELL NUMBER
REQUESTED BY: LAIDLAW ENVIRONMENTAL SERVICES, INC.
WITHIN A 1.0000 MILE RADIUS OF LATITUDE 313411 LONGITUDE 924311

PARISH CODE	WELL NUMBER	OWNER'S NAME / OWNER'S NO.	LATITUDE / LONGITUDE	GEOLOGIC UNIT / DRILLER	SECT	TOWN SHIP	RANGE	WELL USE	DEPTH SUB USE	CASING DIAMETER MATERIAL	SCREEN DIAMETER INTERVAL	DRILL DATE	AVAIL INFO
043	- 63	ETHRIDGE, E A	313404 / 924403	CATAHOULA AQUIFER / UNKNOWN	024	07N	04W	DOMESTIC	95 / --	6		0739	W
043	- 233	WAMPLER, ALLEN	313407 / 924401	CATAHOULA AQUIFER / REX WTR	024	07N	04W	DOMESTIC	90 / --	2 / METAL		1958	Q
043	- 259	LA PUBLIC WORKS TEST#1	313408 / 924355	CATAHOULA AQUIFER / THOMAS, DOYLE	024	07N	04W	TEST HOLE	127 / PA			1969	GH
043	- 260	WAMPLER, ALLEN	313407 / 924354	CATAHOULA AQUIFER / REX WTR	024	07N	04W	DOMESTIC	70 / --	2 / METAL		1958	Q
043	- 287	U S GEOL SURVEY	313412 / 924345	NO WELL MADE, LOG DEPTH SHOWN / U.S.G.S.	024	07N	04W	TEST HOLE	93 / PA			0971	D
043	- 364	WEST GRANT WTR	313407 / 924355	CATAHOULA AQUIFER / STAMM-SCHEELE	024	07N	04W	TEST HOLE	95 / -A	10 / STEEL	10 / 85-95	1973	E W
043	- 365	WEST GRANT WTR	313407 / 924355	CATAHOULA AQUIFER / STAMM-SCHEELE	024	07N	04W	TEST HOLE	68 / -A	10 / STEEL	10 / 58-68	1973	W
043	- 392	WEST GRANT WTR NO 2	313452 / 924317	MONTGOMERY AQUIFER / STAMM-SCHEELE	013	07N	04W	PUBLIC SUPPLY	45 / -R	6	6 / 35-45	1073	D Q W
043	- 393	WEST GRANT WTR NO 3	313412 / 924346	CATAHOULA AQUIFER / STAMM-SCHEELE	024	07N	04W	PUBLIC SUPPLY	75 / -R	6	6 / 66-75	1073	Q W
043	-5127Z	R & D PGI-MW-1	313403 / 924357	CATAHOULA AQUIFER / GROUNDWATER/	024	07N	04W	MONITOR	134 / --	4 / PLASTIC	4 / 114-134	0693	D W
043	-5128Z	R & D PGI-MW-2	313403 / 924357	CATAHOULA AQUIFER / GROUNDWATER/	024	07N	04W	MONITOR	40 / --	4 / PLASTIC	4 / 16-40	0793	D W
043	-5129Z	R & D PGI-MW-3	313403 / 924357	CATAHOULA AQUIFER / GROUNDWATER/	024	07N	04W	MONITOR	53 / --	4 / PLASTIC	4 / 18-53	0793	D W

NUMBER OF WELLS SELECTED IN PARISH = 12

LAIDLAW
ENVIRONMENTAL
SERVICES INC.

APPENDIX B

WASTES TREATED IN OLD BURN UNITS

LAIDLAW
ENVIRONMENTAL
SERVICES INC.

APPENDIX B
WASTES TREATED IN OLD BURN UNITS *
OLD BURN AREA, SAFETY-KLEEN
COLFAX, LOUISIANA

CODE	HAZARDOUS CONSTITUENT
D001	N. A.
D002	N. A.
D003	N. A.
D005	Barium
D006	Cadmium
D007	Chromium
D008	Lead
D011	Silver
D030	2,4-Dinitrotoluene
D035	Methyl ethyl ketone
P009	Ammonium picrate
P105	Sodium azide
K044	N. A.
K046	Lead
U001	Acetaldehyde
U105	2,4-Dinitrotoluene
U108	1,4-Dioxane
U117	Ethane, 1,1-oxybis
U133	Hydrazine
U160	Methyl ethyl ketone peroxide
U163	Guanididne, N-methyl-N'-nitro-N-nitroso
U234	1,3,5-Trinitrobezene

Note: * -Based on review of manifests.

LAIDLAW
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APPENDIX C

STANDARD OPERATING PROCEDURES

USPCI

*S*tandard *O*perating *P*rocedures

FOR

*L*aidlaw / *USPCI C*onsulting *S*ervices

LIST OF SOPs

SOP #	SOP Title
1-A	Sample Packaging and Shipment - Hazardous Materials
1-B	Sample Packaging and Shipment - Environmental Samples
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2-B	Deep Soil Sampling
3	Stockpile Sampling
4	Shallow Sludge and Sediment Sampling
5-A	Field Testing - pH Measurements
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7-A	Fluid Level Measurements in Monitoring Wells
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7-C	Groundwater Sampling - Bailers
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7-E	Groundwater Sampling in the Presence of LNAPL
8	Surface Water Sampling
9	Decontamination for High Concentration Materials
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11-A	Field Monitoring - OVM Model 580B
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13	Data validation
14	Surveying
16	Excavation and Trenches

USPCI
ENVIRONMENTAL SERVICES

Sample Packaging and Shipment
Hazardous Materials (High Concentration)

USPCI Consulting Services SOP Number - 1 (A)
Revision Number - 1 - 1
Date - August 25, 1994

☐ This SOP has been modified to meet site specific conditions. The modifications are detailed in _____ of the Work Plan.

LIMITATION

The procedures outlined in this Standard Operating Procedure (SOP) do not apply to radioactive samples, mixed radioactive wastes, gases, or liquids with boiling points less than ambient or vapor pressures greater than 760 mm (1 atmosphere). This SOP focuses on the packaging of samples for safe transport via air freight or licensed courier. The methods detailed in this SOP for labeling potentially hazardous constituents of high concentration samples are not intended to substitute for the proper identification and labeling of any potentially hazardous material as put forth in the Code of Federal Regulations (CFR), Number 49, Section 172.101. Packaging of samples containing hazardous materials should be performed only by individuals properly trained in current Department of Transportation (DOT) regulation, to include HM181.

THEORY

This SOP describes methods for the proper shipment of environmental samples classified as "Hazardous Materials". Because of sample holding time factors and other time constraints, overnight delivery services are frequently used for shipping samples. Of these carriers, *Federal Express* is the typical choice. However, *Federal Express* has private regulations governing the shipment of Hazardous Materials that extend beyond the current DOT and International Air Transport Association (IATA) rules. This SOP incorporates those rules to assure full compliance. Regardless of carrier choice and sample destination, certain steps must be taken to ensure sample isolation from the outside environment and that sample packaging complies with current DOT and IATA regulations. In addition, the user of this SOP should consider the need to insure the sample shipment against loss or breakage. If insured and properly packaged, the incurred costs of sampling can be recovered.

SUMMARY

According to the EPA and the DOT, field samples are classified as environmental samples or Hazardous Materials. A Hazardous Material is a material, including a hazardous substance, which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce. Commercially available picnic coolers that meet DOT shipping regulations (solid, double walled, plastic or metal with sealable drain plug

___ absorbent material - such as Blue Pig™, 3M Powersorb™, diapers, or cotton
___ plastic trash bags (4 mil thick) - such as Hefty™ Heavy Duty Lawn and Leaf or Glad SteelSac™
___ resealable plastic bags (freezer grade preferred)
___ packing tape or filament tape
___ resealable metal (paint) can(s) and lid
___ metal can(s) clips
___ vermiculite
___ FEDEX "Dangerous Goods" Airbill or bill of lading
___ DOT hazard labels

PROCEDURES

1. Obtain field samples in accordance with USPCI SOP #'s 2, 3, 4, 5, 7, 8.

2. Place adhesive labels on dry sample bottle(s) and include the following information:

- Date & time of sample collection
- Project number
- Preservatives (if any)
- Analytical parameters (use test method #s)
- Sample ID number
- Sampler name
- Matrix type

3. Complete the COC that accompanies the sample containers. Typical information includes the following:

- Client name, phone, and address
- Project name, address, and number
- Sampler name
- Sample ID number
- Date & time of sample collection
- Analytical parameters (use test method #s)
- Sample type
- Matrix type
- Preservatives (if any)
- Number and volume of containers
- Carrier and airbill number

4. Obtain a sturdy cooler in good repair. The cooler design should be tested to satisfy "4H1" or "4H2" standards, and be appropriately marked. Establish with the analytical laboratory prior to any sample shipment that their coolers satisfy this requirement, and have the laboratory mark the certification on each and every cooler. If the laboratory cannot supply certified coolers, select another laboratory, or obtain proper, certified shipping containers at the vendors listed below in this SOP.

5. Secure and tape the drain plug shut with tape.

6. Line the cooler with a large heavy duty trash bag and leave bag open. Place two layers of ¼" foam (½" total) on the bottom of the bag.

shipment of Hazardous Materials. *Federal Express* also requires all Dangerous Goods shipments to be in compliance with current IATA Regulations. If the sampler has any questions regarding shipment via *Federal Express*, a "Dangerous Goods Hotline" can be contacted by phoning **800-238-5355, EXT 1666**.

Federal Express prohibits the use of wet ice in any type of shipping container due to the potential damage any leakage might cause. Consequently, NO ICE is to be used when shipping high concentration samples (Hazardous Materials). Since the matrix is obviously grossly contaminated with concentrations well into percentage ranges, any potential sample degradation due to ambient temperature will be minimal when using an over-night shipper. However, for any USPCI projects with potentially hostile reviewers, it is strongly advised that acceptance of this approach be obtained prior to project startup. If wet ice is used, the cooler must be over-packed with a sealed wax carton if shipping via *Federal Express*. Other shippers such as *UPS* or *Airborne Express* do not require an over-pack when using wet ice.

Hazardous Materials must be shipped in a DOT approved container; coolers which satisfy either "4H1" or "4H2" specifications are appropriate. In general, double-walled plastic and metal coolers with sealable lids and drain spouts have met or exceeded DOT testing for suitable outer packaging. Documentation for this testing is available at USPCI Consulting Services in Boulder, Colorado. The outside of the approved cooler must be marked on two opposing sides with the name and address of the sender of the samples and destination laboratory, arrows indicating which direction is up, proper shipping name of the sample and the suspected principal contaminant, its UN identification number, and any applicable DOT hazard labels. In addition, the container must be labeled to indicate compliance with "4H1" or "4H2" specifications; a typical label might read *UN4H2/X/06/S/91/OK/Coleman*. This certification indicates that the container satisfies the *4H2* spec, is approved for use for all three United Nations packing groups (I, II, or III and so gets an *X* rating), has a maximum of *6* kilograms of hazardous materials inside, is *S*olid in conjunction with its packing sorbents, was manufactured in *1991*, was tested in *OK*lahoma, and was manufactured by the *Coleman* Corporation. All of this information may be placed on stickers or printed legibly. Containers made especially for the shipment of Hazardous Materials are strongly recommended. They can be purchased from companies such as **Labelmaster**, phone **800-621-5808** or the **Polyfoam Packer's Corporation**, phone **800-323-7442**. These commercial containers may be labeled to satisfy "4G" requirements. A typical Labelmaster or Polyfoam box might be marked *UN4G/X3.4/S/94/USA/AA0749*. Don't use containers without such certifications!

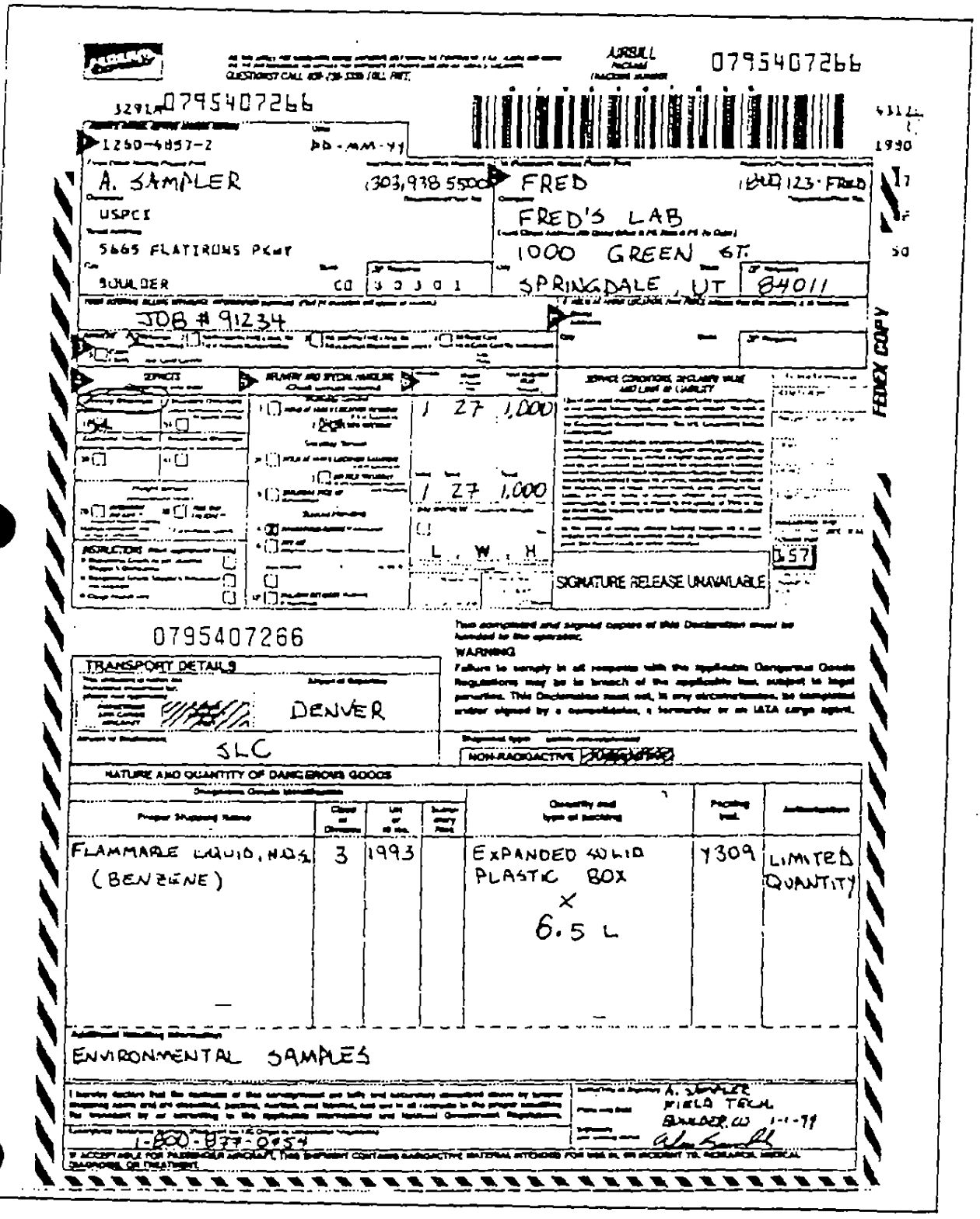
Under certain circumstances, it may be beneficial to purchase custom made foam packing inserts which fit directly into a cooler or box. These foam shippers contain pre-cut cavities to fit sample bottle(s) and ice packs. When dealing with extra large or odd shaped sample containers, similar foam shippers can also be purchased to isolate and custom fit the container with a substantial foam padding. **Polyfoam Packer's Corporation** and **Labelmaster** (a USN Performance Plus product line) manufacture these shipping containers.

The sample packer or shipper has a regulatory responsibility for checking his container prior to shipment to ensure that it has not been damaged since the "4H1", "4H2", "4G" or other certification was placed on the unit.

BEST COPY

USPCI
CAPACITY
ENVIRONMENTAL SERVICES

Exhibit 1-1



0795407266

329L 0795407266

1250-4857-2 DD-MM-YY 1990

A. SAMPLER (303) 938 5500

USPCI

5665 FLATIRONS PKWY

BOULDER CO 3 0 3 0 1

FRED (BUD 123-FRED)

FRED'S LAB

1000 GREEN ST.

SPRINGDALE, UT 84011

JOB # 91234

FEDEX COPY

1 27 1,000

1 27 1,000

L W H

SIGNATURE RELEASE UNAVAILABLE

0795407266

TRANSPORT DETAILS

DENVER

SLC

WARNING

Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.

NON-RADIOACTIVE

NATURE AND QUANTITY OF DANGEROUS GOODS

Proper Shipping Name	Class or Division	UN No.	Packing Group	Quantity and type of packing	Packing Inst.	Authorization
FLAMMABLE LIQUID, N.O.S. (BENZENE)	3	1993		EXPANDED SOLID PLASTIC BOX x 6.5 L	Y309	LIMITED QUANTITY

ENVIRONMENTAL SAMPLES

A. SAMPLER FIELD TECH. BOULDER, CO 1-1-94

1-800-877-0954

IF ACCEPTABLE FOR PASSENGER AIRCRAFT, THIS SHIPMENT CONTAINS RADIOACTIVE MATERIAL INTENDED FOR USE IN, OR INCIDENT TO, RESEARCH, MEDICAL DIAGNOSIS, OR TREATMENT.

USPCI
CAMECO
ENVIRONMENTAL SERVICES

Sample Packaging and Shipment
Environmental Materials (Low Concentration)

USPCI Consulting Services SOP Number - 1 (B)
Revision Number - 1
Date - July 19, 1994

☐ This SOP has been modified to meet site specific conditions. The modifications are detailed in _____ of the Work Plan.

LIMITATIONS

The procedures outlined in this Standard Operating Procedure (SOP) do not apply to radioactive samples, mixed radioactive wastes, gases, or liquids with boiling points less than ambient or vapor pressures more than 760 mm (1 atmosphere). This SOP focuses on the packaging of samples for safe transport via air freight or licensed courier. The methods detailed in this SOP for labeling potentially hazardous constituents of environmental samples are not intended to substitute for the proper identification and labeling of any potentially hazardous material as put forth in the Code of Federal Regulation (CFR), Number 49, Section 172.101. Packaging of samples containing hazardous materials should be performed only by individuals properly trained in current Department of Transportation (DOT) regulations.

THEORY

This SOP describes methods for the proper shipment of environmental samples having a principal contaminant with a low concentration. Because of sample holding time factors and other time constraints, overnight delivery services are frequently used for shipping samples. Of these carriers, *Federal Express* is the typical choice. However, *Federal Express* has private regulations governing the shipment of any potentially hazardous substance that extend beyond the current DOT and International Air Transport Association (IATA) rules. This SOP incorporates those rules to assure full compliance. Regardless of carrier choice and sample destination, certain steps must be taken to ensure sample isolation from the outside environment and that sample packaging complies with current DOT and IATA regulations. In addition, the user of this SOP should consider the need to insure the sample shipment against loss or breakage. If insured and properly packaged, the incurred costs of sampling can be recovered.

SUMMARY

According to the Environmental Protection Agency (EPA) and the DOT, field samples are classified as environmental samples or "Hazardous Materials". A Hazardous Material is a material, including a hazardous substance, which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce.

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EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

Environmental Samples - Low Concentration Samples

___ field samples
___ chain of custody (COC) forms
___ self adhesive labels
___ plastic cooler (double walled, sealable, no styrofoam)
___ bubble wrap
___ ¼" foam padding
___ absorbent material - such as Blue Pig™, 3M Powersorb™, diapers, or cotton
___ plastic trash bag (4 mil thick)
___ resealable plastic bags (freezer grade preferred)
___ packing tape or filament tape
___ ice ("blue" or ice substitute) - Please see "Additional Information" below

PROCEDURES

1. Obtain field samples in accordance with USPCI SOP #'s 2, 3, 4, 5, 7, 8.

2. Place adhesive labels on dry sample bottles and include the following information:

- Date & time of sample collection
- Project number
- Preservatives (if any)
- Analytical parameters (use test method #s)
- Sample ID number
- Sampler name
- Matrix type

3. Complete the COC form that accompanies the sample containers. Typical information includes the following:

- Client name, phone, and address
- Project name, address, and number
- Sampler name
- Sample ID number
- Date & time of sample collection
- Analytical parameters (use test method #s)
- Sample type
- Matrix type
- Preservatives (if any)
- Number and volume of containers
- Carrier and airbill number

4. Select a sturdy cooler in good repair. Secure and tape the drain plug shut with fiber tape.

5. Line the cooler with a large heavy duty trash bag and leave bag open. Place two layers of ¼" foam (½" total) on the bottom of the bag.

6. Be sure the bottle lids are tight (will not leak).

7. Wrap the bottles in two layers of bubble wrap, length and width, at least ½" to 1" thick total.

4. Sodium hydroxide (NaOH) in water solutions of 0.080% by weight or less (pH about 12.3 or less).

Please consult 40 CFR, Section 136.3, Table II for more information.

Ice is also used as a preservative by chilling and maintaining sample temperatures to 4°C. However, *Federal Express* prohibits the shipment of ice in any container due to the potential damage any leakage might cause. Therefore, when shipping via *Federal Express*, an ice substitute such as "blue ice" or Insul-Ice™ must be used. Insul-Ice™ is available through the Polyfoam Packer's Corporation, phone 800-323-7442. *Federal Express* stipulates that if wet ice is used, the cooler must be over-packed with a waxed and sealed carton. Other shippers such as *UPS* and *Airborne Express* do allow the use of wet ice without over-packing.

For all samples, carrier shipping request forms contain a section to insure the package for its declared value (Section 6 on a FEDEX Airbill, Exhibit 1-1). This amount may include all incurred costs of the sampling event such as airfare, lodging, car rental, etc. However, there is an additional cost for this service and the expenses must be proven with actual receipts. In addition, if the carrier deems the package or cooler improperly packed, no expense amount may be recovered for damage resulting in sample loss. Testing has demonstrated that these SOP methods comply with and meet DOT, IATA, and Federal Express "proper packing" criteria. Documentation of this testing is available at USPCI Consulting Services in Boulder.

Under certain circumstances, it may be beneficial to purchase custom made foam packing inserts which fit directly into a cooler or box. These foam shippers contain pre-cut cavities to fit sample bottles and ice packs. When dealing with extra large or odd shaped sample containers, similar foam shippers can also be purchased to isolate and custom fit the container with a substantial foam padding. When foam shippers are used, certain steps in this SOP can be omitted. These steps are the second part of Step 5; and all of Steps 7, 8, 9, and 11. Possible vendors for these products include Polyfoam Packer's Corporation, phone 800-323-7442 and Labelmaster's "USN Performance Plus" product line, phone 800-621-5808.

REFERENCE

International Air Transport Association, "Dangerous Goods Regulations," (IATA Resolution 618, Attachment "A"), 34th Edition, Montreal, 1993.

Office of the Federal Register, National Archives and Records Administration, "Code of Federal Regulations, Protection of Environment, Number 40," Parts 100 to 149 and Parts 260 to 299, Washington DC, 1992.

Office of the Federal Register, National Archives and Records Administration, "Code of Federal Regulations, Transportation, Number 49," Parts 100 to 177, Washington DC, 1992.

USEPA, "A Compendium of Superfund Field Operations Methods," 540 P-87 001, (OSWER Directive 9355.0-14), Washington DC, December, 1987.

USPCI
ENVIRONMENTAL SERVICES

Shallow Surface Soil Sampling

USPCI Consulting Services SOP Number - 2 (A)
Revision Number - 1
Date - May 22, 1994

☐ This SOP has been modified to meet site specific conditions. The modifications are detailed in _____ of the Work Plan.

THEORY

This Standard Operating Procedure (SOP) describes methods for sampling surface and near surface soils and monofill materials. The hand tools needed for the job include trowels, hand augers, thin walled tube samplers, triers, and split spoons. These sampling tools should be selected based on soil types and contaminant of interest; each match between a tool and soil type/contaminant should yield samples sufficiently representative that environmental data can be drawn from the sample. Representative samples are critical, because the resulting environmental data should be both unbiased (i.e. accurate) and precise.

SUMMARY

The degree of allowable disturbance in a soil sample is determined by the contaminant of interest, and the soil type. The hand tools listed in this SOP are designed to be pressed into soils or soil-like materials, and then withdrawn with the sample held in the tool.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

___ sampling plan
___ maps
___ field logbooks
___ data forms
___ PPE dictated by site health and safety plan
___ brunton and tape measure, if necessary
___ survey stakes or flags
___ camera and film, if necessary
___ homogenization buckets or bowls, if necessary
___ sample containers
___ resealable plastic bags, if necessary
___ sample labels
___ sample chain of custody seals, if necessary
___ chain of custody forms
___ cooler(s) or carry - boxes

PROCEDURES

1. Review sampling plan and health and safety plan.
2. Assemble gear inventory.
3. Decontaminate gear (see USPCI SOP 9 or 10).
4. Assemble sampling tools, if necessary.
5. Mark all sampling locations according to the sampling plan.
6. Place plastic sheeting (or equivalent) on the ground adjacent to the sampling point.
7. Place sampling gear on the sheeting.
8. Remove excess surficial material, such as vegetation, trash, or rocks, if necessary.
9. Plunge and rotate the tool into the soil or monofill formation.
10. Extract the tool.
11. Place the collected soil either in the sampling bowl or directly into the container.
12. Homogenize the sample in the sampling bowl, if specified in the sampling plan. **Do not homogenize for ultra-trace level volatile organics analysis.**
13. Make sure that the sampling container contains as much soil material as practical.
14. Attach a label to each sample container. Refer to USPCI SOP 1 for labeling requirements.
15. Attach the container security seal, if instructed in the sampling plan.
16. Complete the chain of custody form, indicating what analyses are necessary for each sample. See USPCI SOP 1A and 1B for chain of custody requirements.
17. Complete the field logbooks and the field forms, as required in the sampling plan.
18. Pack the samples to meet United States' Department of Transportation (DOT) and any Courier requirements. Refer to USPCI SOP 1 for DOT and Federal Express requirements.
19. Remove all sampling refuse from the sampling site.

USPCI
CANONIE ENVIRONMENTAL SERVICES

Deep Soil Sampling

USPCI Consulting Services SOP Number - 2 (B)
Revision Number - 1
Date - May 22, 1994

☐ This SOP has been modified to meet site specific conditions. The modifications are detailed in _____ of the Work Plan.

THEORY

This Standard Operating Procedure (SOP) describes methods for sampling soils and monofill materials from depths unreachable with hand tools. The tools needed for the job include hand-operated power augers, small truck-mounted drill rigs, or a large mobile drilling rig. Once a boring has been advanced to the desired sampling depth, then a variety of sample tubes can be used to retrieve representative samples. The combination of power tool and sampling device is determined by the contaminant of interest, and the soil type; each match between a tool and soil type/contaminant should yield samples sufficiently representative that permit environmental data to be interpreted from the sample. Representative samples are critical, because the resulting environmental data should be both unbiased (i.e. accurate) and precise.

SUMMARY

The degree of allowable disturbance in soil samples is determined by the contaminant of interest, and the soil type. The drilling equipment and sampling tools listed in this SOP are designed to develop a boring to the horizon depth of interest, then retrieve a sample sufficiently representative of subsurface conditions.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

___ sampling plan
___ maps
___ field logbooks
___ data forms
___ PPE dictated by site health and safety plan
___ brunton and tape measure, if necessary
___ survey stakes or flags
___ camera and film, if necessary
___ homogenization buckets or bowls, if necessary
___ sample containers
___ resealable plastic bags, if necessary
___ sample labels
___ sample chain of custody seals, if necessary

3. Decontaminate gear (see USPCI SOP 9 or 10).

4. Mark all sampling locations according to the sampling plan; AFTER PERFORMING A UTILITY CHECK.

5. PAY ATTENTION TO OVERHEAD WIRES.

6. Position rig over sample location.

7. Place plastic sheeting (or equivalent) on the ground adjacent to the sampling location, but far enough away from the drill rig so that the crew is not hindered by its presence.

8. Place sampling gear on the sheeting.

9. Advance the boring to the desired sampling depth.

10. If samples are to be obtained from drill cuttings, retrieve the materials from the drilling slough. Be advised that sample origin, depth, and analyses for VOA constituents cannot be precisely controlled and will be subject to interpretation.

11. Describe the cutting lithology, if required in the sampling plan.

12. If samples are to be obtained from the air cyclone rig, retrieve the materials as they are expelled from the unit.

13. If relatively undisturbed samples are to be obtained, attach either a split spoon or thin walled sampler onto the drilling center rod. Note: The sampler should be attached to the center rod at a drilled depth that is equivalent to the desired sampling depth minus the length of the sampler. For example, an 18-inch split spoon sampler would be attached to the center rod at a depth of 8.5 feet to acquire a driven sample at depth of 10 feet.

14. Drive the sampling tool the entire length into the soil or monofill at the desired depth.

15. Count the number of blows required to drive the split spoon sampler (# blows per six inches), if necessary.

16. Retrieve the soil sampler, open it, and place the tool on the sheeting.

17. Remove the slough from the upper length of the barrel. Slough can be identified because it shows no *in situ* soil textures, and is less consolidated than undisturbed soils.

18. Describe the soil lithology, if required in the sampling plan.

19. Homogenize the sample, if specified in the sampling plan. **Do not homogenize for ultra-trace level volatile organics analysis.**

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ENVIRONMENTAL
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Stockpile Sampling

USPCI Consulting Services SOP Number - 3
Revision Number - 1
Date - May 22, 1994

☐ This SOP has been modified to meet site specific conditions. The modifications are detailed in _____ of the Work Plan.

THEORY

This Standard Operating Procedure (SOP) describes methods for sampling disturbed soils and monofill materials from a stockpile. Stockpile sampling techniques often utilize two sampling strategies: (1) reconnaissance sampling, and (2) statistically based sampling. Determinations of the Resource Conservation and Recovery Act (RCRA) status of the stockpiled material may require a statistically based sampling plan.

SUMMARY

After the sampling strategy for a stockpile is determined in the sampling plan, the proper tool is selected so that the resulting sample is sufficiently representative of the stockpiled material. The hand tools listed in this SOP are designed to be pressed or driven into the stockpiled soil, and then withdrawn with the sampling held in the tool. In some cases, tools will be used to scoop the soil from the stockpile.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

___ sampling plan
___ maps
___ field logbooks
___ data forms
___ PPE dictated by site health and safety plan
___ brunton and tape measure, if necessary
___ survey stakes or flags
___ camera and film, if necessary
___ homogenization buckets or bowls, if necessary
___ sample containers
___ resealable plastic bags, if necessary
___ sample labels
___ sample chain of custody seals, if necessary
___ chain of custody forms
___ cooler(s) or carry - boxes
___ wet ice or blue ice, if necessary

the stockpiled material.

10. Extract the tool and place it on the plastic sheeting.

11. If sampling with a hand auger, remove the slough from the upper length of the barrel. Slough can be identified because it shows no *in situ* soil textures, and is less consolidated than undisturbed soils.

12. Place the collected soil either in the sampling bowl or directly into the container.

13. Homogenize the sample in the bowl, if specified in the sampling plan. **Do not homogenize for ultra-trace level volatile organics analysis.**

14. Place the properly sized aliquot in the sample container.

15. Make sure that the sampling container contains as much soil material as practical.

16. Attach a label to each sample container. Refer to USPCI SOP 1 for labeling requirements.

17. Attach the container security seal, if instructed in the sampling plan.

18. Describe the soil sample, if required in the workplan.

19. Complete the chain of custody form, indicating what analyses are necessary for each sample. See USPCI SOP 1 for chain of custody requirements.

20. Complete the field logbooks and the field forms, as required in the sampling plan.

21. Pack the samples to meet United States' Department of Transportation (DOT) and any Courier requirements. Refer to USPCI SOP 1 for DOT and Federal Express requirements.

22. Remove all sampling refuse from the sampling site.

USPCI
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ENVIRONMENTAL
SERVICES

Shallow Sludge and Sediment Sampling

USPCI Consulting Services SOP Number - 4
Revision Number - 1
Date - May 22, 1994

☐ This SOP has been modified to meet site specific conditions. The modifications are detailed in _____ of the Work Plan.

THEORY

This Standard Operating Procedure (SOP) describes methods for sampling surface sludges and sediments. The hand tools needed for the job include trowels, hand augers, thin walled tube samplers, triers, and split spoons. In some instances a hand operated diaphragm pump may be suitable. For this SOP, surface sludges and sediments are defined as those mineral and organic materials constituting or situated beneath a body of liquid (such as a pond or stream).

These sampling tools should be selected based on sludge/sediment type and contaminant of interest. Such match between a tool and soil type/contaminant should yield samples sufficiently representative that environmental data can be interpreted from the sample. Representative samples are critical, because the resulting environmental data should be both unbiased (i.e. accurate) and precise.

SUMMARY

The degree of allowable disturbance in a sludge or sediment sample is determined based on the type and the contaminant of interest. The hand tools listed in this summary are designed to be pressed into the sludge or sediment, and then withdrawn with the sample held in the tool. In some cases, tools will be used to pump or scoop the sludge and sediment.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

___ sampling plan
___ maps
___ field logbooks
___ data forms
___ PPE dictated by site health and safety plan
___ brunton and tape measure, if necessary
___ survey stakes or flags
___ sample boat with guiding lines, if necessary

___ six inch diameter Schedule 60 PVC pipe, cut into appropriate lengths, if dictated in sampling and analysis plan
___ mallets and 2 x 4's, if Schedule 60 PVC pipe is used

Sampling Tool Selection, Continued

* Hand augers are not preferred for low concentration volatile organic analyses because the tool could outgas ultratrace levels of volatile organics.

** Some regulatory agencies require brass inner liners for tube or spoon samples.

*** Pumps are best used to generate composite samples. Decontamination between sampling points can be time consuming. The resulting volatile organic analysis (VOA) data should be viewed as reconnaissance level.

PROCEDURES

1. Review sampling plan and health and safety plan.
2. Assemble gear inventory.
3. Decontaminate gear (see USPCI SOP 9 or 10).
4. Assemble sampling tools, if necessary.
5. Mark all sampling locations according to the sampling plan. Sampling flags or stakes placed on the perimeter of the pond can help if sampling beneath large water bodies.
6. Place plastic sheeting (or equivalent) on the ground adjacent to the water body.
7. Place sampling gear on the sheeting.
8. Place the sampling boat (if used) in the water, and load with the minimum necessary gear.
9. Locate the sampling point.
10. Drive the PVC pipe to the desired depth horizon, if needed.
11. Plunge and rotate the tool (or pump) into the sludge or sediment formation. This can occur within the PVC caisson.
12. Extract the tool, or operate the pump.
13. Place the collected sludge or sediment either in the sampling bowl or directly into the container.
14. Homogenize the sample in the sampling bowl and composite, if specified in the sampling plan. **Do not homogenize for ultra-trace level volatile organics analysis.**

USPCI
ENVIRONMENTAL SERVICES

Field Testing - pH Measurements

USPCI Consulting Services SOP Number - 5 (A)
Revision Number - 1
Date - June 13, 1994

☐ This SOP has been modified to meet site specific conditions. The modifications are detailed in _____ of the Work Plan.

THEORY

A pH unit describes the extent of acidity or alkalinity for an aqueous solution. It is defined as:

$$pH = - Log [H^+]$$

In any aqueous solution at a temperature of 25°C, $[H^+]$ (the hydrogen ion concentration) and $[OH^-]$ (the hydroxyl ion concentrations) will total to 10^{-14} moles / liter. For a given aqueous solution (at 25°C), if the hydrogen ion concentration is greater than the hydroxyl ion concentration, the pH of that solution is less than 7 and the material is acidic. Conversely, if the hydrogen ion concentration is less than the hydroxyl ion concentration, the pH of that solution is greater than 7 and the material is basic.

An electronic pH measurement system consists of a measuring electrode, a reference electrode and an electrical resistance meter. The pH measuring electrode is a glass bulb sensitive to hydrogen ion concentrations, and its resistance to the flow of electricity will change with the hydrogen ion concentration in contact with the bulb. The reference electrode's electrical resistance does not change with the pH of the solution. The electrical resistance meter measures these two resistance values, and presents to the user a value for the test solution's pH.

pH meters are temperature sensitive, i.e. the resistance of the electrodes changes with temperature. A correction factor is applied to the readout, so that all readings are converted to the value expected at 25°C.

SUMMARY

This Standard Operating Procedure (SOP) describes the field method for obtaining pH measurements in fluid samples. Prior to sampling, a calibrated pH meter is used to determine the pH of waters during well purging. A two point calibration is used to determine instrument accuracy. The results are temperature compensated to 25°C.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

Table 1: pH Information

Date	Time	Name	Reading	Comment

3. Press the "CAL" button to enter calibration mode.

4. Immerse the electrode 1/2 to 1 inch into standard solution.

5. Stir gently, and allow the instrument to stabilize.

6. The display should show the standard pH solution in which the probe is immersed. If it does not, keep the probe in solution and adjust reading by turning a small screwdriver inside the lower hole in the back of the probe until the correct number is displayed.

7. Rinse electrode with deionized water.

8. Repeat the above steps for the other standard solutions to compete the slope adjustments.

9. Record all data in field logbook or data sheet according to Table 1.

C. **pH Testing:**

1. To turn on the pH probe, remove cap and press "ON/OFF" button on the keypad.

2. Rinse electrode and sample container with deionized water. Dispose of water.

3. Obtain aqueous samples using appropriate methods.

4. Rinse electrode with sample. Dispose of rinsate.

5. Rinse the sample container with sample and dispose. Refill sample container with sample.

6. Immerse the pH probe 1/2 to 1 inch in the sample container containing aqueous sample. (Note: Do not immerse the electrode above color band, as this will "fry" the instrument.) Stir once and allow the display to stabilize.

7. Press the "ON/OFF" button to shut off the probe.

reading of 2-3 pH is made) check the glass bulb on the end of the probe. These bulbs are easily broken. If the bulb is broken, the probe must be replaced.

7. If at all possible, have backup pocket meters on-site.

REFERENCE

APHA - AWWA - WPCF, 1989, Standard Methods for the Examination of Water and Wastewater

Cole Parmer, Box instructions for Microprocessor Based Pocket Size ATC pH Tester

Omega Engineering, Inc., "Introduction to pH"

4. Rinse sample container thoroughly with sample and dispose of water.

5. Obtain aqueous sample.

6. Immerse the temperature probe in the sample container containing aqueous sample.

7. Allow the display to stabilize.

8. Record all data in field logbook or data sheet according to Table 1.

Table 1: Temperature Probe Information

Date	Time	Name	Reading	Comment

9. Clean the unit by rinsing in distilled or deionized water.

10. If water samples contain oil, dip in isopropyl alcohol to can clean away residues.

11. If temperature probe is turned on and the probe is submersed and there is no reading, check to see if the cap has been removed from the probe.

REFERENCE

APHA - AWWA - WPCF, 1989, Standard Methods for the Examination of Water and Wastewater

PROCEDURES

A. Calibration:

1. Select a calibration standard appropriate for the TDS probe. When selecting a TDS standard, it is best to use a standard which has a similar chemical makeup as the test solution.

2. To turn on the TDS probe, remove cap and press "ON/OFF" button on the keypad or on top of the instrument.

3. Immerse the electrode 1/2 to 1 inch into standard solution.

4. Stir gently and allow the instrument to stabilize. (Note: Temperature has a direct effect on conductivity readings. As the temperature of the sample rises, so does the conductivity reading.)

5. The display should show the standard TDS solution in which the probe is immersed. If it does not, keep the probe in solution and adjust the reading by turning a small screwdriver inside the lower hole in the back of the probe until the correct number is displayed.

6. Rinse electrode with distilled or deionized water.

7. Repeat the calibration if the ambient temperature changes by more than 10°F

8. Record all data in field logbook or data sheet according to Table 1.

Table 1: Conductivity Information

Date	Time	Name	Reading	Comment

B. TDS Testing:

1. To turn on the TDS probe, remove cap and press "ON/OFF" button on the keypad or on top of the instrument.

2. Rinse electrode and sample container with deionized water. Dispose of water.

3. Obtain aqueous samples using appropriate methods.

USPCI
ENVIRONMENTAL SERVICES

Monitoring Well Development

USPCI Consulting Services SOP Number - 6 (B)
Revision Number - 1
Date - May 22, 1994

☐ This SOP has been modified to meet site specific conditions. The modifications are detailed in _____ of the Work Plan.

THEORY

Groundwater samples must be as representative as possible of aquifer groundwater conditions. Installation of groundwater monitoring wells disturbs the wells' host formation. The purpose of monitoring well development is to restore, as much as is practical, nearby formation conditions to the original condition.

Well development ensures removal of fines from the vicinity of the well screen and restores the natural hydraulic conductivity of the formation. This allows free flow of water from the formation to the well and also reduces the turbidity of the water during sampling events. Turbidity reduction is critical, because sampling of improperly developed turbid wells can bias analytical results.

SUMMARY

In general, the well should be developed shortly after it is drilled to remove fines produced during drilling. A variety of techniques are available for development: bailing, surge block, over-pumping, and jetting with water or air. Each technique creates reversals and surges in groundwater flow to remove bridging by particles.

Formation waters should be used for developing the well. In low-yielding formations, an outside source of water may sometimes be introduced into the well to facilitate development. It is essential that at least five times the amount of water added to the well be produced back from the well in order to ensure that all added water is removed from the formation.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

___ field logbooks
___ PPE dictated by site health and safety plan
___ water level meter
___ pH meter
___ thermometer
___ conductivity meter
___ PPE and monitoring equipment as required by the site health and safety plan
___ containers to hold development water (if necessary)

7. Obtain a sample, and measure initial pH, conductivity and temperature see USPCI SOP 7A, 7B, and 7C.

8. Note initial color, clarity and odor of the water. DO NOT intentionally smell samples.

9. Develop well until water is clear and free from sediment. (NOTE: If the water does not clear sufficiently, it will be necessary to use a decision chart for turbid groundwater samples, such as Figure 3-4 of the EPA RCRA Technical Enforcement Guidance Document, when returning to sample the well.

10. Containerize development waters if appropriate, for later disposal.

11. Note final pH, temperature, conductivity, color, clarity and odor of the water sample.

12. Record method of development and any problems encountered in the field logbook.

13. Remove all sampling refuse from the site.

REFERENCE

Barcelona, M. J. et al., 1985. Practical Guide for Ground - Water Sampling, EPA/600/2-85/104

USEPA, 1987, RCRA Ground-water Monitoring Technical Enforcement Guidance Document; USEPA Office of Waste Programs Enforcement, Office of Solid Waste and Emergency Response, September 1986, 208 pp.

USEPA, Compendium of ERT groundwater sampling procedures, Interim Final; Office of Emergency and Remedial Response, OSWER Directive 9360.4-06, January 1991, SOP #2156.

USEPA and NWWA, 1989, Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells, EPA 600/4-89/034.

___ datalogger (to record data from pressure transducer)
___ slug of known volume and associated equipment (often constructed of PVC pipe and cable) Note: do not use glue on connections
___ field computer (optional)
___ tape or string
___ decontamination supplies

PROCEDURES

1. Program datalogger and transducer with desired time measurement interval. Note: some transducers are "stand alone" and do not require a datalogger in the field.

2. Review the sampling plan and health and safety plan.

3. Assemble gear inventory.

4. Decontaminate transducer, cable and well probe (see USPCI SOP 9 and 10).

5. Assemble gear, if necessary.

6. Open well and conduct continuous air monitoring if required by the health and safety plan.

7. Measure and record Depth to Water (DTW) and Total Depth (TD) (See USPCI SOP 7A).

8. Cover sharp edges of well casing with tape to protect transducer cable.

9. Check combined diameter of transducer cable and slug with the diameter of the well to ensure that the slug will not bind on the cable when it is placed in the well.

10. Lower the transducer in the well so that it will be below the depth of the submerged slug. Do not set the transducer on the bottom of the well because sediment in the bottom of the well will affect the transducer's sensitivity.

11. Connect datalogger to transducer cable.

12. Begin logging data to establish a "static" water level.

13. Record time of test and static depth measurement in the field logbook.

14. Drop slug in or pull slug out of well. (NOTE: This should be done as quickly as possible because the analysis assumes an "instantaneous" change in volume.)

15. Continue logging until the water level returns to equilibrium value noted in Item 10, or a sufficient amount of data has been recorded to clearly show a trend, i.e. 90% of the curve.

USPCI
ENVIRONMENTAL SERVICES

Monitoring Well Pump Tests

USPCI Consulting Services SOP Number - 6 (D)
Revision Number - 1
Date - May 22, 1994

☐ This SOP has been modified to meet site specific conditions. The modifications are detailed in _____ of the Work Plan.

LIMITATIONS

The generation and interpretation of pump test data is best conducted with the aid of a trained hydrogeologist.

THEORY

Pumping tests provide the most reliable method of determining aquifer hydrogeologic characteristics. Aquifer pump testing allows for the estimation of transmissivity (T) and storage coefficient (S), two important hydraulic parameters of an aquifer. These parameters are calculated from one of various methods of graphically comparing the drawdown and time data.

SUMMARY

Groundwater is pumped from a well at a determined discharge rate. The discharge rate can be constant or variable, depending on the pump test plan. Water levels in the pumping well and nearby observation wells are recorded, according to set time intervals once the test has begun. Recording can be done manually, with a data logger, or both recording methods can be used for a large number of wells. If water depths are to be manually recorded, additional personnel may be needed during the early part of the test in order to gauge all of the wells over the required time intervals.

The duration of the test is determined by project needs and aquifer properties. Verification data may be obtained by monitoring the rise (recharge) in the wells after the pumping has stopped. A step test, where the well is pumped at successively greater discharges, may be conducted to determine optimal pumping rate and/or well efficiency.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

___ health and safety plan
___ map of site
___ field log book
___ PPE and monitoring equipment as required by site health and safety plan

14. Record water levels in the pumping and observation wells according to the tables below.

Time Intervals for Measuring
Drawdown in the Pumping Well

Elapsed Time From Start of Test (minutes)	Interval Between Measurements (minutes)
0-10	0.5-1
10-15	1
15-60	5
60-300	30
300-1440	60
1440-end	480

Time Intervals for Measuring Drawdown
in an Observation Well

Elapsed Time From Start of test (minutes)	Interval Between Measurements (minutes)
0-60	2
60-120	5
120-240	10
240-360	30
360-1440	60
1440-end	480

15. Testing should be conducted for approximately 24 hours for a confined aquifer and 72 hours for an unconfined aquifer.

15. Periodically check the flow rate to make sure it remains constant.

Remove all testing equipment and refuse from the site.

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Fluid Level Measurements in Monitoring Wells

USPCI Consulting Services SOP Number - 7 (A)
Revision Number - 1
Date - June 13, 1994

☐ This SOP has been modified to meet site specific conditions. The modifications are detailed in _____ of the Work Plan.

THEORY

This Standard Operating Procedure (SOP) describes the method for measuring the fluid level in a monitoring well. Fluid level measurements may consist of three types: 1) measurement of the depth to groundwater; 2) measurement of the volume of water standing in a monitoring well; and 3) measurement of the thickness of an immiscible layer on the groundwater. The depth to water (DTW) is needed to determine the horizontal and vertical groundwater flow gradients for an aquifer. The standing volume of water is necessary to calculate the purge volume prior to monitor well sampling. Finally, fluid level measurements may also involve determining the thickness of immiscible layers in the well, both as light, non-aqueous phase liquids (LNAPLs) and dense, non-aqueous phase liquids (DNAPLs).

SUMMARY

Fluid level measurements are made by lowering an electric probe attached to a measuring tape down the well until the device indicates that an interface media (e.g. air/water, air/oil, oil/water) has been encountered. The measurement is made from a reference point marked on the well casing. The elevation of the reference point is established by a licensed surveyor, accurate within 0.01 foot. The measurement should be recorded in a field note book and/or field data sheet immediately. If possible, two independent measurements should be made to ensure that the tape is being read accurately.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

___ ground cloth
___ water level indicator or interface probe
___ organic vapors monitor (OVM)
___ PPE dictated by site health and safety plan
___ decontamination equipment (See USPCI SOP 9 and 10)
___ field logbook or sample data sheets

USPCI
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Monitoring Well Purging Using Bailers

USPCI Consulting Services SOP Number - 7B
Revision Number - 1 - 1
Date - March 30, 1995

☐ This SOP has been modified to meet site specific conditions. The modifications are detailed in _____ of the Work Plan.

LIMITATION

Considerable discussion exists on the best technique for purging monitoring wells. Some researchers have indicated that, under certain conditions, purging may not be required. Other researchers have indicated that multiple well volumes (> > 5) of well bore waters should be removed prior to obtaining any samples considered representative of the aquifer. This Standard Operating Procedure (SOP) describes USPCI's methods for purging monitoring wells, and should apply to most sites. Alternative techniques are possible, and USPCI Project Manager should consult a USPCI Hydrogeologist or Geochemist when warranted.

THEORY

When obtaining a groundwater sample it is critical that the sample is representative of the water in the formation being sampled. Water that has remained in the well-casing for extended periods of time has the opportunity to exchange gases with the atmosphere and react with well casing materials. This stagnant water is not representative of that in the aquifer and must be removed prior to sampling.

Purging is considered complete when the pH, electrical conductivity, and temperature have stabilized. The definition of "stabilized" may depend upon site conditions and instrumentation. For example, consecutive measurements within 10% of each other may indicate stabilization. Measurements are repeated for each well volume of water removed until the parameters have stabilized. If a well is bailed dry before three casing volumes are removed, the well is sampled when the volume of water in the well is sufficient.

SUMMARY

Prior to purging, all equipment is decontaminated, staged at the wellhead on a clean ground cloth, and the water level has been measured according to USPCI SOP 7A. The volume of water in the casing is calculated by multiplying the height of the water column in the well by an appropriate conversion factor. The conversion factors for various casing diameters are provided in Exhibit 1.

The bailer is secured to an appropriate length of nylon rope or string and is lowered into the well. When the bailer is full of fluid, it is carefully retrieved so that the length of string does not drop on unprotected ground and contaminate it. The bailer is then emptied of fluid into a calibrated bucket until one casing volume is removed, or the well is dry. After each volume of bore water is removed, the pH, conductivity, and temperature are measured and recorded in a field notebook and/or data

11. Carefully raise the bailer such that the string is oriented over the plastic sheeting and does not become tangled. Do not allow the string to drop to the unprotected ground and contaminate it.

12. Examine the bailer for evidence of a floating light, non-aqueous phase liquids (LNAPLs) or an oil sheen. If present, do not sample the well.

13. Examine the bailer for evidence of a dense, non-aqueous phase liquids (DNAPLs).

14. Empty the bailer into the calibrated bucket.

15. Continue bailing until one casing volume is extracted or the monitoring well is dry.

16. If the well is bailed dry, allow to recover and sample.

17. After each volume is removed, obtain a sample in the beaker to measure pH, conductivity, and temperature (see USPCI SOPs 5A, 5B, and 5C).

18. Remove the additional well volume and repeat the measurements until the parameters have stabilized. The stabilization criteria are:

    pH: $\pm$ 0.02 pH units
    Specific conductance: $\pm$ 10 %
    Temperature: $\pm$ 0.1 °C

19. Drum all purge water, if appropriate.

20. Sample the monitoring well (see USPCI SOPs 7B, 7C, and 7D).

REFERENCE

EPA, 1985, Practical Guide for Groundwater Sampling, EPA/600/2-85/104

EPA, 1986, RCRA Ground Water Monitoring Technical Enforcement Guidance Document

EPA/NWWA, 1989, Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells, EPA 600/4089/034

EPA, 1991, Compendium of ERT Groundwater Sampling Procedures, OSWER Directive 9360.4-06

Driscoll, 1986. Groundwater and Wells (The Johnson Manual)

USPCI
ENVIRONMENTAL SERVICES

Groundwater Sampling Using Bailers

USPCI Consulting Services SOP Number - 7 (C)
Revision Number - 2
Date - December 16, 1994

☐ This SOP has been modified to meet site specific conditions. The modifications are detailed in _____ of the Work Plan.

THEORY

It is important for groundwater samples to be representative of groundwater conditions *in situ*. This Standard Operating Procedure (SOP) describes methods for sampling groundwater from a well with a bailer. The SOP will not address the sampling of nonaqueous phase liquids (NAPL) as floaters (LNAPLs) or sinkers (DNAPLs) in groundwater.

SUMMARY

A groundwater water sample is collected from a monitoring well by slowly lowering a clean ball check bailer into the well water. Once full the bailer is lifted from the well and the water is poured into the necessary sample containers. Some of the equipment required to purge and measure the well water parameters (e.g. pH and conductivity meters, filters, etc.) will also be a part of the well sampler's inventory. Proper usage of these items is discussed in other USPCI SOPs.

Aeration should be minimized when collecting the water in the bailer and when pouring the water into the containers. Sample bottles may contain preservative depending on the expected holding times. The samples should be stored in a chilled environment (about 4°C) while on the job site and during shipment to the lab.

There are several different classes of bailers that may be selected for a job. The choice of a bailer depends on the contaminants expected and the acceptable level of Quality Assurance (QA) for the analytical results. Guidelines for selection of the proper bailer are provided in this SOP.

EQUIPMENT / APPARATUS INVENTORY AND CHECKLIST

___ sampling plan
___ maps
___ field logbooks
___ data forms
___ PPE dictated by site health and safety plan
___ sample containers
___ sample labels

- Unnecessary for QA on normal detailed projects.

Stainless Steel

Recommended uses and advantages:

- Similar QA as teflon for most substances.
- Easily cleaned for reuse in other wells, if required.
- Heavy, will sink quickly in high density, saline water.

Disadvantages:

- Expensive
- May give interference for certain metals.
- May corrode after repeated use in saline water.

PVC - disposable

Recommended use and advantages:

- Bailer of choice, in addition to dedicated bailers, for sampling on most normal detail projects. Appropriate for sampling petroleum-fuel contaminated sites and collecting water with low quantities of solvents.
- Disposing of bailer after single use means that water will not be recontaminated by release at a later sample event of adsorbed hydrocarbons on bailer PVC material.
- Inexpensive unit cost.

Disadvantages:

- Not to be used where there are high concentrations of aggressive solvents.
- The tendency for PVC to adsorb hydrocarbons may influence (lower) results where high detail/high QA is required.

PVC - dedicated

4. Place sampling gear on the sheeting.

5. Decontaminate gear (see USPCI SOP 9 or 10).

6. Assemble required laboratory sample jars, bottles, vials.

7. Mark labels with indelible ink. The most generic label should include the sample number and confirmation of a preservative. See USPCI SOPs 1A or 1B.

8. Attach labels to dry containers.

9. If necessary, prepare containers requiring preservative by adding the needed amount as per laboratory instructions. Care should be taken to avoid spilling acid or base preservative on skin or clothes.

10. Prepare filtration method, if required (see USPCI SOP 7D).

11. Prepare bailer: If disposable, remove bailer from plastic bag and attach nylon rope or string. If dedicated, detach old string and replace with new. Ensure that ball valve has free movement and is functional.

12. Slowly lower the bailer into the monitoring well. All actions should be completed slowly to avoid turbidity. Do not allow the bailer to rest at the bottom of the well, as fine sediments may be trapped impede the ball valve.

13. Allow the bailer to fill with fluid.

14. Carefully raise the bailer such that the string is oriented over the plastic sheeting and does not become tangled. Do not allow the string to drop to the unprotected ground and become contaminated. While lifting, listen for water running out of the bailer due to an improper seal on the ball valve. If a leak is present, lower the bailer back into the water and try removing it again with a properly seated ball valve.

15. If volatile organic compounds (VOCs) are the target analytes, slowly pour water from the bottom of the bailer into the sample containers using the pour tube.

    a. If 40 ml VOA vials are used, collect water in these first. Carefully pour water in the vial until a prominent meniscus forms at the rim. Do not overfill the vial; this will cause a loss of preservative.

    b. Check the vial for bubbles adhering to the sides. If present, tap the side of the vial slightly with finger.

    c. Place the teflon-lined cap over the mouth of the vial and tightly screw it into place.

    d. Perform a final check for bubbles by tapping it firmly against a soft object, such as an

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Groundwater Sample Collection - Filtering

USPCI Consulting Services SOP Number - 7 (D)
Revision Number - 1 - 1
Date - June 13, 1994

☐ This SOP has been modified to meet site specific conditions. The modifications are detailed in _____ of the Work Plan.

LIMITATION

Use of field filtration techniques is best performed after considering project objectives and groundwater geochemistry. Do not filter for volatile organics analyses without consulting with a USPCI Geochemist or Data Validator prior to use of field filtering equipment.

THEORY

Monitoring well construction can damage its host formation. This damage can lead to the introduction of suspended particulates into the well casing. These particulates, if incorporated into a groundwater sample sent for laboratory analysis, can bias resulting data high. This bias results from the attraction of many environmental hydrophobic pollutants to these suspended particulates. Alternatively, suspended particulates can directly elevate concentrations of measured metals due to the introduction of naturally occurring metals into the sample. Filtration allows removal of these particulates and results in unbiased analytical data that is more representative of groundwater chemistry *in situ*.

SUMMARY

This Standard Operating Procedure (SOP) describes the methods for filtering groundwater samples. Once a determination has been made to field filter groundwater samples, the constituents of concern and filtering equipment may be selected as follows:

- **semivolatile target analytes** - stainless steel filter with dedicated teflon tubing
- **metals analyses** - acrylic filter housing with reusable tubing
- **removal of suspended particulates/colloids analysis** - filter with 0.45 micron mesh size
- **removal of colloids** - series of filters with 0.1 or 0.05 micron mesh size

Several types of hardware are available for use. These include:

- syringe injectors
- hand operated pumps and vessels
- peristaltic pump with a tabletop filter housing

THE GROUNDWATER PRIOR TO FILTRATION.

8. Assemble the filtering equipment according to the manufacturer's specifications. Connect the filtering equipment to a power source, such as a car battery, if necessary.

9. Pump the collected groundwater from its original container through the filter. Discard the first 50 % of the sample. Collect the remaining filtered water in a clean sample container, where the final volume is sufficient for the laboratory's needs. It is best if the sample is filtered as soon as possible after collection.

10. Add the appropriate preservative to the filtered sample, if necessary.

11. Place the lid on the sample container and tighten.

12. Complete the field logbooks and the field forms, as required in the sampling plan.

13. Pack the samples to meet United States' Department of Transportation (DOT) and any Courier requirements. Refer to USPCI SOP 1A and 1B for DOT and Federal Express requirements.

Remove all sampling refuse from the sampling site.

REFERENCE

Backhus, D. A., et al., 1993, Sampling Colloids and Colloid - Associated Contaminants in Ground Water, Groundwater 31, p. 466 - 479.

EPA, 1985, Practical Guide for Groundwater Sampling, EPA/600/2-85/104

EPA, 1986, RCRA Ground Water Monitoring Technical Enforcement Guidance Document

EPA, 1990, Colloidal - Facilitated Transport of Inorganic Contaminants in Ground Water: Part I. Sampling Considerations, EPA/600/M-90/023

___ chain of custody forms
___ cooler(s) or carry - boxes
___ wet ice or blue ice, if necessary
___ decontamination supplies (see USPCI SOP 9 and 10)
___ drop cloths, plastic sheeting, or Visqueen (or equivalent)
___ paper towels
___ indelible ink pen
___ disposal or dedicated teflon bailers
___ nylon rope or string
___ distilled water

PROCEDURES

The data collected prior to sampling will be the depth to LNAPL, depth to water, and depth to Dense Non - Aqueous Phase Liquids (DNAPLs) if present. The well head location will have been prepared for the sampling event during purging.

1. Review sampling plan and health and safety plan.

2. Assemble sampling gear inventory.

3. Place plastic sheeting (or equivalent) on the ground adjacent to the sampling point.

4. Place sampling gear on the sheeting.

5. Decontaminate gear (see USPCI SOP 9 or 10).

6. Assemble required laboratory sample jars, bottles, vials.

7. Mark labels with indelible ink. The most generic label should include the sample number and confirmation of a preservative. See USPCI SOPs 1A or 1B.

8. Attach labels to dry containers.

9. If necessary, prepare containers requiring preservative by adding the needed amount as per laboratory instructions. Care should be taken to avoid spilling acid or base preservative on skin or clothes. Pure LNAPL samples do not require chemical preservatives.

10. Prepare bailer: If disposable, remove bailer from plastic bag and attach nylon rope or string. If dedicated, detach old string and replace with new. Ensure that ball valve has free movement and is functional.

11. Slowly lower the bailer into the monitoring well. All actions should be completed slowly to avoid turbidity. Stop the downward progress of the bailer when it is approximately 75 % full.

21. Remove all sampling refuse from the sampling site.

NOTE: For organics and other analytes with 7 to 14 day holding times, it is advisable to ship the water samples in sealed, iced coolers to the lab every 2 to 3 days. Check if the shipper allows wet ice in the containers during shipment.

REFERENCE

NWWA/USEPA. 1986. RCRA Ground Water Monitoring Technical Enforcement Guidance Document. TEGD. USEPA-NWWA, Dublin, OH.

USEPA. 1991. Compendium of ERT Groundwater Sampling Procedures. OSWER Directive 9360.4-06. USDOC-NTIS, Springfield, VA.

USEPA. 1985. Practical Guide for Groundwater Sampling. EPA/600/2-85/104. USDOC-NTIS, Springfield, VA.

USEPA Region VIII, 1993, Suggested Procedures for Sampling Ground Water and Dense Non-Aqueous Phase Liquids from Groundwater Monitoring Wells that Contain Light Non - Aqueous Phase Liquids, TZ4-R08009-SO-11995.

APPENDIX N

FINANCIAL ASSURANCE

LOUISIANA CERTIFICATE OF INSURANCE FOR CLOSURE OR POST-CLOSURE CARE

Name and Address of Insurer (herein called the "Insurer"):

Steadfast Insurance Company
1400 American Lane
Schaumburg, Illinois 60196

Name and Address of Insured (herein called the "Insured"):

Clean Harbors, Inc.
1501 Washington Street
Braintree, Massachusetts 02184

Facilities Covered:

EPA Identification No. LAD 981-055-791
Clean Harbors Colfax, LLC
3763 Highway 471
Colfax, LA 71417
Closure Cost: $359,903

EPA Identification No. LAD 000-778-514
Clean Harbors Plaquemine, LLC
32655 Gracie Lane
Plaquemine, LA 70764
Closure Costs: $199,456
Post Closure Costs: $29,920

EPA Identification No. LAD 010-395-127
Clean Harbors Baton Rouge, LLC
13351 Scenic Highway
Baton Rouge, LA 70807
Closure Costs: $3,147,350
Post Closure Costs: $9,554,454

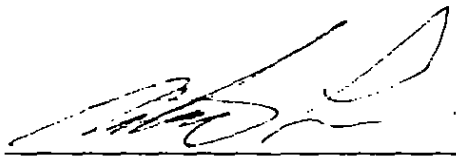
EPA Identification No. LAD 079-464-095
Crowley Disposal, LLC
P.O. Box 283, 2029 Bayou Plaquemine Road
Rayne, LA 70527
Closure Costs: $3,053,235

Face Amount:	$16,344,318
Policy Number:	PLC 5254310-00
Effective Date:	September 6, 2002

The Insurer hereby certifies that it has issued to the Insured the policy of insurance identified above to provide financial assurance for closure and post closure for the facilities identified above. The Insurer further warrants that such policy conforms in all respects with the requirements of LAC 33:V.3707.E, 3711.E, 4403.D, and 4407.D as applicable and as such regulations were constituted on the date shown immediately below. It is agreed that any provision of the policy inconsistent with such regulations is hereby amended to eliminate such inconsistency.

Whenever requested by the administrative authority, the Insurer agrees to furnish to the administrative authority a duplicate original of the policy listed above, including all endorsements thereon.

I hereby certify that the wording of this certificate is identical to the wording specified in LAC 33:V:3719.E as such regulations were constituted on the date shown immediately below and the Insurer is authorized to do business in the State of Louisiana.



Arthur Lyev, Senior Underwriting

Authorized Representative of: Steadfast Insurance Company
Administrative Officer
1400 American Lane
Schaumburg, IL 60196-1056

Signature of witness or notary:

Date: 07-11-2003

CERTIFICATE HOLDER

Steadfast Insurance Company Endorsement #6

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

POLICY NO.	EFF. DATE OF POLICY	EXP. DATE OF POLICY	EFF. DATE OF END.	PRODUCER	ADD'L PREMIUM	RETURN PREMIUM
PLC 5254310-00	**09/06/02**	**09/06/03**	**09/06/02**	**18615**	**N/A**	**N/A**

This endorsement is issued by the company named in the Declarations. It changes the policy on the effective date listed above at the hour stated in the Declarations.

NAMED INSURED: **Clean Harbors, Inc.**
ADDRESS: 1501 Washington Street
Braintree, MA 02184

This endorsement modifies insurance provided by the following:

Closure and Post-Closure Environmental Liability Insurance Policy

CLAIMS MADE AND REPORTED COVERAGE

This endorsement, effective 12:01 a.m., September 6, 2002 forms a part of Policy No. PLC 5254310-00 issued to CLEAN HARBORS, Inc. by Steadfast Insurance Company.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

CLOSURE/POST CLOSURE LOCATION SCHEDULE

This endorsement modifies insurance provided under the following:

It is hereby agreed that endorsement #4 is deleted in its entirety and replaced by the following:

CLOSURE AND/OR POST CLOSURE POLICY

Section I., INSURING AGREEMENT, applies to the location(s) listed below, but solely as respects liability of the INSURED:

Location(s) owned, leased or operated by the INSURED:

	EPA ID No.	Closure	Post-Closure
1.Clean Harbors Colfax, LLC 3763 Highway 471 Colfax, LA 71417	LAD 981 055 791	$359,903	
2.Clean Harbors Plaquemine, LLC 32655 Gracie Lane	LAD 000 778 514	$199,456	$29,920

Plaquemine, LA 70764

3.Clean Harbors White Castle, LLC 52735 Clark Road White Castle, LA 70788	P-0059	$938,282	$381,206
4.Clean Harbors Baton Rouge, LLC 13351 Scenic Highway Baton Rouge, LA 70807	LAD 010 395 127	$3,147,350	$9,554,454
5.Clean Harbors Crowley, LLC P.O. Box 283 2029 Bayou Plaquemine Road Rayne, LA 70527	LAD079464095	$3,053,235	

All other terms and conditions remain the same.

Steadfast Insurance Company Endorsement #7

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

POLICY NO.	EFF. DATE OF POLICY	EXP DATE OF POLICY	EFF. DATE OF END.	PRODUCER	ADD'L PREMIUM	RETURN PREMIUM
PLC 5254310-00	**09/06/02**	**09/06/03**	**09/06/02**	**18615**	**N/A**	**N/A**

This endorsement is issued by the company named in the Declarations. It changes the policy on the effective date listed above at the hour stated in the Declarations.

NAMED INSURED: **Clean Harbors, Inc.**
ADDRESS: 1501 Washington Street
Braintree, MA 02184

This endorsement modifies insurance provided by the following:

Closure and Post-Closure Environmental Liability Insurance Policy

CLAIMS MADE AND REPORTED COVERAGE

This endorsement, effective 12:01 a.m., September 6, 2002 forms a part of Policy No. PLC 5254310-00 issued to CLEAN HARBORS, Inc. by Steadfast Insurance Company.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

CLOSURE/POST CLOSURE LOCATION SCHEDULE

This endorsement modifies insurance provided under the following:

It is hereby agreed that Item 4: Limit of Liability is amended to read:

4: Limit of Liability: $17,663,806

All other terms and conditions remain the same.

HAZARDOUS WASTE FACILITY CERTIFICATE OF LIABILITY INSURANCE

1. Steadfast Insurance Company, (the "Insurer") of 1400 American Lane, Schaumburg, IL 60196 hereby certifies that it has issued liability insurance covering bodily injury and property damage to Clean Harbors Colfax, LLC, (the "insured"), of 3763 Highway 471, Colfax, LA 71417 in connection with the insured's obligation to demonstrate financial responsibility under LAC 33:V.3715 or 4411. The coverage applies at LAD 981 055 791, Clean Harbors Colfax, LLC, 3763 Highway 471, Colfax, LA 71417 for sudden accidental occurrences. The limits of liability are $1,000,000 each occurrence and $2,000,000 aggregate, exclusive of legal defense costs. The coverage is provided under policy number PLC 3743936-03, issued on May 12, 2003. The effective date of said policy is May 1, 2003.

2. The insurer further certifies the following with respect to the insurance described in Paragraph 1:

   a. Bankruptcy or insolvency of the insured shall not relieve the insurer of its obligation the policy.

   b. The insurer is liable for the payment of amounts within any deductible applicable to the policy, with a right of reimbursement by the insured for any such payment made by the insurer. This provision does not apply with respect to that amount of any deductible for which coverage is demonstrated as specified in LAC 33:V.3715.F or 4411.

   c. Whenever requested by the administrative authority, the insurer agrees to furnish to the administrative authority a signed duplicate original of the policy and all endorsements.

   d. Cancellation of the insurance, whether by the insurer, the insured, a parent corporation providing insurance coverage for its subsidiary, or by a firm having an insurable interest in and obtaining liability insurance on behalf of the owner or operator of the hazardous waste management facility, will be effective only upon written notice and only after the expiration of 60 days after a copy of such written notice is received by the administrative authority.

   e. Any other termination of the insurance will be effective only upon written notice and only after the expiration of 30 days after a copy of such written notice is received by the administrative authority.

I hereby certify that the wording of this instrument is identical to the wording specified in LAC 33:V.3719.J as such regulation was constituted on the date this certificate was issued, as indicated below, and that the insurer is licensed to transact the business of insurance, or eligible to provide insurance as an excess of surplus lines insurer, in one or more states, and is authorized to conduct insurance business in the state of Louisiana.

Signature _____

Jayne Cunningham

Regional Vice President

Authorized Representative of: Steadfast Insurance Company
Administrative Officer
1 Liberty Plaza
New York, NY 10006

DATE OF ISSUANCE: 5/12/2003

APPENDIX O

CLIMATOLOGICAL DATA

Station: ALEXANDRIA State: LA Index No: 16-0098-05 MONTHLY CLIMATE SUMMARY: 1992 - 2002

	Monthly Temperatures			Monthly Extremes				Number of Days Daily Max T			Number of Days Daily Min T			Degree Days		Monthly Prec	One Day Maximum		Number of Days Rain	Number of Days with PREC >=			
Month	MAX	MIN	AVG	HI	Dt	LO	Dt	msg	>=90	<=32	msg	<=32	<=0	HDD	CDD	Total	Total	Dt	Days	0.1	0.5	1.0	msg
1992 JAN	56.6	38.1	47.4	69	26	25	16	0	0	0	0	7	0	542	0	7.31	1.44	12	11	9	6	4	0
FEB	65.9	45.3	55.6	82	16	33	9	0	0	0	0	0	0	274	7	5.43	1.79	13	11	9	3	2	0
MAR	69.9	50.4	60.2	82	16	34	11	0	0	0	0	0	0	154	11	4.13	1.87	5	8	6	3	1	0
APR	76.1	55.6	65.9	88	25	41	3	0	0	0	0	0	0	70	102	3.31	0.69	20	10	6	5	0	0
MAY	82.8	62.8	72.8	92	15	48	7	0	2	0	0	0	0	14	264	2.58	1.14	26	9	5	2	1	0
JUN	88.8	70.8	79.8	97	20	62	1	0	15	0	0	0	0	0	450	9.14	5.05	30	15	11	4	1	0
JUL	92.3	73.7	83.0	97	7	70	1	0	27	0	0	0	0	0	566	3.53	1.30	18	9	7	2	1	0
AUG	88.5	69.8	79.2	95	8	62	16	0	14	0	0	0	0	0	446	3.75	1.42	12	5	5	2	2	0
SEP	86.5	67.9	77.2	93	11	51	30	0	11	0	0	0	0	0	375	4.03	2.45	22	4	3	3	2	0
OCT	79.8	55.8	67.8	86	27	48	9	0	0	0	0	0	0	16	109	2.50	1.03	30	6	4	3	1	0
NOV	63.7M	44.5	54.1M	83	1	28	29	1	0	0	0	2	0	333E	16E	6.70	1.82	20	10	10	6	3	0
DEC	60.1	43.3	51.7	74	31	30	1	0	0	0	0	1	0	410	1	5.84	1.46	10	13	8	5	3	0
ANNUAL			66.2M	97		25		1	69	0	0	10	0	1813E	2347E	58.25	5.05		111	83	44	21	0
1993 JAN	58.0	40.3	49.2	75	1	31	27	0	0	0	0	2	0	485	0	5.61	1.37	21	13	10	4	2	0
FEB	62.6	40.1	51.4	82	22	30	19	0	0	0	0	4	0	374	0	2.54	1.60	26	4	4	1	1	0
MAR	66.5	46.0	56.3	81	10	26	14	0	0	0	0	2	0	279	15	6.68	2.80	2	10	9	3	2	0
APR	71.5	51.4	61.5	82	26	40	16	0	0	0	0	0	0	146	48	7.54	2.40	8	7	7	5	4	0
MAY	81.0	62.9	72.0	87	30	55	3	0	0	0	0	0	0	5	231	5.18	2.31	2	9	6	3	2	0
JUN	88.8	72.2	80.5	96	15	58	1	0	17	0	0	0	0	0	471	6.59	1.55	24	12	9	7	2	0
JUL	93.2	74.9	84.1	99	30	71	16	0	28	0	0	0	0	0	597	4.21	2.25	11	5	4	2	2	0
AUG	95.6	75.2	85.4	101	21	72	29	0	30	0	0	0	0	0	640	1.71	1.25	5	8	3	1	1	0
SEP	90.9	68.0	79.5	99	3	51	28	0	22	0	0	0	0	1	445	1.29	0.90	27	4	2	1	0	0
OCT	77.4	56.6	67.0	89	7	30	31	0	0	0	0	1	0	85	154	3.76	0.95	14	7	6	4	0	0
NOV	64.3	42.8	53.6	84	14	29	27	0	0	0	0	5	0	359	22	8.11	3.50	15	11	8	3	3	0
DEC	60.9	40.5	50.7	75	3	28	31	0	0	0	0	6	0	439	6	4.01	1.17	14	9	6	3	1	0
ANNUAL			65.9	101		26		0	97	0	0	20	0	2173	2629	57.23	3.50		99	74	37	20	0
1994 JAN	55.8	36.5	46.2	73	7	21	19	0	0	0	0	10	0	579	2	12.53	4.75	27	12	5	4	3	0
FEB	62.3	41.6	52.0	79	9	27	2	0	0	0	0	7	0	377	16	3.09	0.90	21	9	6	4	0	0
MAR	70.2	48.0	59.1	83	24	34	3	0	0	0	0	0	0	209	34	4.31	1.62	9	6	6	4	1	0
APR	77.6	56.7	67.2	88	28	35	7	0	0	0	0	0	0	81	150	4.05	2.14	6	4	2	2	2	0
MAY	80.7	63.1	71.9	88	12	53	3	0	0	0	0	0	0	11	231	11.62	2.75	8	16	13	7	3	0
JUN	90.1	72.9	81.5	96	10	68	1	0	18	0	0	0	0	0	501	4.54	1.60	5	11	7	4	1	0
JUL	90.3	73.0	81.7	95	8	66	28	0	19	0	0	0	0	0	522	6.12	1.17	27	15	12	5	1	0
AUG	89.8	72.2	81.0	95	15	68	16	0	21	0	0	0	0	0	502	4.06	1.40	30	11	9	2	1	0
SEP	87.1	66.2	76.6	95	30	50	25	0	9	0	0	0	0	0	358	1.96	0.73	17	7	4	2	0	0
OCT	77.5	59.4	68.5	92	1	44	27	0	2	0	0	0	0	52	165	13.11	4.55	19	11	9	6	3	0
NOV	71.8	52.4	62.1	83	4	43	30	0	0	0	0	0	0	113	35	2.08	0.95	10	7	5	1	0	0
DEC	62.1	43.4	52.8	78	9	30	12	0	0	0	0	4	0	378	6	4.76	1.27	17	9	8	3	2	0
ANNUAL			66.7	96		21		0	69	0	0	21	0	1800	2522	72.23	4.75		118	86	44	17	0

M - indicates that daily observations are missing from the records

\- indicates that degree day values are estimated

indicates that the data is preliminary and is NOT quality controlled

This summary is provided by the Southern Regional Climate Center (SRCC) and the Louisiana Office of State Climatology (LOSC). The SRCC/LOSC is solely responsible for these data.

Station: ALEXANDRIA State: LA Index No: 16-0098-05 MONTHLY CLIMATE SUMMARY: 1992 - 2002

		Monthly Temperatures			Monthly Extremes				Number of Days Daily Max T				Number of Days Daily Min T				Degree Days		Monthly Prec	One Day Maximum		Number of Days Rain	Number of Days with PREC >=			Number of Days PREC
	Month	MAX	MIN	AVG	HI	Dt	LO	Dt	msg	>=90	<=32		msg	<=32	<=0		HDD	CDD	Total	Total	Dt	Days	0.1	0.5	1.0	msg
5	JAN	59.9	40.8	50.4	77	12	25	5	0	0	0		0	7	0		452	6	7.06	3.00	27	13	7	4	2	0
	FEB	65.3	41.5	53.4	78	3	29	12	0	0	0		0	4	0		324	7	2.04	0.54	17	10	6	1	0	0
	MAR	69.5	52.1	60.8	86	23	32	8	0	0	0		0	1	0		195	71	11.89	4.60	7	14	12	5	3	0
	APR	76.5	56.5	66.5	85	18	46	1	0	0	0		0	0	0		53	106	11.07	4.85	23	8	6	3	3	0
	MAY	85.0	65.8	75.4	91	11	54	2	0	8	0		0	0	0		3	334	5.73	2.78	31	8	8	5	1	0
	JUN	90.3	69.5	79.9	95	6	59	13	0	19	0		0	0	0		0	454	5.26	1.73	29	6	5	4	2	0
	JUL	93.1	73.9	83.5	101	29	67	6	0	23	0		0	0	0		0	580	8.54	3.44	6	10	9	6	2	0
	AUG	94.9	75.7	85.3	100	19	73	2	0	28	0		0	0	0		0	639	2.17	0.70	1	8	6	2	0	0
	SEP	90.5	67.3	78.9	99	2	52	23	0	20	0		0	0	0		9	434	3.96	2.70	22	3	3	2	2	0
	OCT	79.8	55.9	67.9	91	1	42	21	0	2	0		0	0	0		34	129	5.94	5.45	3	7	3	1	1	0
	NOV	67.6	44.5	56.1	86	3	32	12	0	0	0		0	3	0		268	6	5.79	2.65	11	9	7	3	2	0
	DEC	59.4	40.4	49.9	83	4	22	10	0	0	0		0	12	0		478	18	8.52	2.57	19	8	7	6	3	0
	ANNUAL			67.3	101		22		0	100	0		0	27	0		1816	2784	77.97	5.45		104	79	42	21	0
1996	JAN	59.8	36.5	48.2	76	18	19	8	0	0	0		0	12	0		514	1	4.44	1.45	6	11	7	3	1	0
	FEB	63.4	42.2	52.8	82	23	14	4	0	0	4		0	8	0		390	41	1.37	1.10	2	4	2	1	1	0
	MAR	65.8	43.0	54.4	82	16	25	9	0	0	0		0	8	0		353	34	3.48	1.10	27	9	6	2	1	0
	APR	76.0	53.8	64.9	86	20	37	7	0	0	0		0	0	0		96	101	9.61	2.75	23	6	5	5	4	0
	MAY	86.9	68.4	77.7	93	29	47	1	0	8	0		0	0	0		5	407	3.32	1.82	30	3	3	3	1	0
	JUN	89.5	70.6	80.1	94	18	63	9	0	16	0		0	0	0		0	462	6.64	1.89	20	9	8	4	3	0
	JUL	92.9	74.4	83.7	98	4	71	26	0	28	0		0	0	0		0	585	3.24	1.89	25	6	6	2	1	0
	AUG	90.2	72.4	81.3	95	3	68	13	0	23	0		0	0	0		0	514	3.15	0.51	29	15	10	2	0	0
	SEP	86.4	66.9	76.7	95	17	53	29	0	9	0		0	0	0		2	358	4.37	1.36	27	6	5	4	2	0
	OCT	78.4	57.1	67.8	86	18	40	23	0	0	0		0	0	0		44	138	6.81	3.90	26	7	5	4	2	0
	NOV	68.9	48.8	58.9	84	2	33	27	0	0	0		0	0	0		201	24	5.22	3.34	18	4	4	2	2	0
	DEC	63.7	44.6	54.2	81	13	20	19	0	0	0		0	6	0		348	20	5.59	2.28	16	8	6	3	2	0
	ANNUAL			66.7	98		14		0	84	4		0	34	0		1953	2685	57.24	3.90		88	67	35	20	0
1997	JAN	57.7	39.7	48.7	79	25	23	17	0	0	2		0	10	0		514	19	5.86	2.90	28	11	9	2	1	0
	FEB	62.0	44.2	53.1	80	2	34	15	0	0	0		0	0	0		342	17	13.18	4.00	13	10	10	8	5	0
	MAR	74.0	54.5	64.3	87	29	43	16	0	0	0		0	0	0		90	74	2.76	1.10	26	12	4	2	1	0
	APR	72.2	51.7	62.0	87	22	39	13	0	0	0		0	0	0		103	20	8.53	2.93	26	8	7	5	4	0
	MAY	83.3	63.9	73.6	90	27	54	5	0	3	0		0	0	0		0	275	3.76	1.88	25	8	6	2	2	0
	JUN	88.8	70.8	79.8	95	25	60	2	0	16	0		0	0	0		0	451	3.83M	1.53M	25	6M	6	4	1	1
	JUL	94.2	74.8	84.5	98	24	71	6	0	29	0		0	0	0		0	615	3.46	0.87	7	7	5	4	0	0
	AUG	91.8	72.8	82.3	98	18	65	25	0	24	0		0	0	0		0	545	3.38	2.45	10	5	3	2	1	0
	SEP	90.3	69.0	79.7	96	1	60	27	0	21	0		0	0	0		0	444	2.99	1.25	4	8	7	2	1	0
	OCT	78.6	57.1	67.9	92	1	40	28	0	2	0		0	0	0		85	179	3.99	2.75	24	3	3	2	2	0
	NOV	64.6	45.2	54.9	79	2	29	17	0	0	0		0	3	0		304	10	5.24	1.69	29	9	6	4	2	0
	DEC	58.5	39.0	48.8	75	10	29	15	0	0	0		0	8	0		496	0	6.36	2.94	24	8	5	4	2	0
	ANNUAL			66.6	98		23		0	95	2		0	21	0		1934	2649	63.34M	4.00M		95M	71	41	22	1

M - indicates that daily observations are missing from the records

E - indicates that degree day values are estimated

* - indicates that the data is preliminary and is NOT quality controlled

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Station: ALEXANDRIA State: LA Index No: 16-0098-05 MONTHLY CLIMATE SUMMARY: 1992 - 2002

	Monthly Temperatures			Monthly Extremes				Number of Days: Daily Max T			Number of Days: Daily Min T			Degree Days		Monthly Prec	One Day Maximum		Number of Days: Rain	Number of Days: with PREC >=			
Month	MAX	MIN	AVG	HI	Dt	LO	Dt	msg	>=90	<=32	msg	<=32	<=0	HDD	CDD	Total	Total	Dt	Days	0.1	0.5	1.0	msg
8 JAN	61.7	43.6	52.7	73	19	33	1	0	0	0	0	0	0	378	3	9.46	4.60	7	10	9	5	2	0
FEB	62.7	43.7	53.2	74	26	34	7	0	0	0	0	0	0	323	0	6.42	1.88	11	10	9	4	3	0
MAR	68.2	48.4	58.3	83	30	29	12	0	0	0	0	4	0	253	53	5.67	3.65	8	5	4	2	2	0
APR	75.4	54.5	65.0	85	9	45	5	0	0	0	0	0	0	67	73	3.17	1.05	19	6	5	3	1	0
MAY	87.8	67.8	77.8	99	31	57	1	0	9	0	0	0	0	0	405	0.00	0.00	0	0	0	0	0	0
JUN	93.8	75.1	84.5	102	1	60	7	0	25	0	0	0	0	0	590	2.20	1.88	6	3	2	1	1	0
JUL	97.4	76.7	87.1	103	31	73	2	0	29	0	0	0	0	0	692	1.64	1.10	2	3	3	1	1	0
AUG	95.8	75.5	85.7	107	2	72	7	0	27	0	0	0	0	0	647	10.44	5.70	7	8	8	4	2	0
SEP	90.7	73.6	82.1	99	4	69	4	0	23	0	0	0	0	0	523	9.53	4.50	12	8	8	4	3	0
OCT	80.5	60.3	70.4	96	2	45	23	0	3	0	0	0	0	20	197	0.92	0.45	4	4	2	0	0	0
NOV	69.8	52.2	61.0	83	2	41	6	0	0	0	0	0	0	144	33	6.91	2.20	14	8	5	4	3	0
DEC	60.8	44.0	52.4	82	7	27	26	0	0	0	0	6	0	416	32	9.24	4.10	12	7	7	5	2	0
ANNUAL			69.2	107		27		0	116	0	0	10	0	1601	3248	65.60	5.70		72	62	33	20	0
1999 JAN	65.0	42.9	54.0	79	22	22	5	0	0	0	0	8	0	355	21	9.62	4.60	30	8	6	4	4	0
FEB	68.3	47.5	57.9	82	8	31	22	0	0	0	0	2	0	235	44	1.02	0.60	28	3	3	1	0	0
MAR	69.6	47.9	58.8	80	7	36	15	0	0	0	0	0	0	190	4	3.47	1.50	13	8	6	3	1	0
APR	80.7	61.2M	71.0M	90	29	41	17	0	1	0	1	0	0	42E	230E	4.37	3.80	4	3	2	2	1	0
MAY	84.7	64.1M	74.4M	90	9	54	1	0	3	0	1	0	0	0E	300E	4.12	1.65	31	7	4	3	2	0
JUN	88.4	72.1M	80.3M	92	6	66	1	0	11	0	1	0	0	0E	464E	6.53	1.29	10	13	10	7	1	0
JUL	92.0	74.7	83.4	98	24	72	13	0	28	0	0	0	0	0	578	0.45	0.08	28	9	0	0	0	0
AUG	99.0	75.5	87.3	105	20	69	16	0	30	0	0	0	0	0	697	0.13	0.11	3	2	1	0	0	0
SEP	89.3	65.5	77.4	97	1	49	23	0	18	0	0	0	0	3	382	3.33	2.15	29	9	6	1	1	0
OCT	80.1	54.3	67.2	90	4	38	26	0	1	0	0	0	0	67	143	2.86	2.42	9	5	3	1	1	0
NOV	73.5	45.8	59.7	83	1	33	26	0	0	0	0	0	0	167	14	0.91	0.68	20	2	2	1	0	0
DEC	63.2	37.5	50.4	79	5	28	22	0	0	0	0	8	0	448	1	4.97	1.16	5	8	7	4	3	0
ANNUAL			68.5M	105		22		0	92	0	3	18	0	1507E	2878E	41.78	4.60		77	50	27	14	0
2000 JAN	63.2	42.5	52.9	79	13	28	31	0	0	0	0	7	0	383	14	1.35	0.70	28	3	2	2	0	0
FEB	69.7	44.3	57.0	82	19	28	1	0	0	0	0	5	0	251	26	0.46	0.38	27	2	1	0	0	0
MAR	74.5	52.7	63.6	85	29	38	20	0	0	0	0	0	0	111	75	7.80	1.77	11	9	8	7	3	0
APR	75.8	53.9	64.9	87	21	41	9	0	0	0	0	0	0	75	80	5.79	3.55	3	5	5	3	2	0
MAY	85.9	68.0	77.0	92	28	58	15	0	8	0	0	0	0	0	380	5.91	2.18	3	6	6	3	2	0
JUN	89.5	71.4	80.5	95	24	60	8	0	18	0	0	0	0	0	468	2.55	0.46	15	14	10	0	0	0
JUL	94.4	73.5	84.0	102	21	67	26	0	27	0	0	0	0	0	593	4.96	1.14	9	9	9	6	1	0
AUG	97.0	73.8	85.4	108	31	69	14	0	30	0	0	0	0	0	638	0.91	0.34	23	4	4	0	0	0
SEP	90.6	66.9	78.8	109	1	53	28	0	16	0	0	0	0	5	421	2.17	1.00	13	8	5	1	1	0
OCT	81.6	56.0	68.8	92	6	42	11	0	4	0	0	0	0	49	175	1.96	1.00	8	2	2	2	1	0
NOV	64.7	44.4	54.6	83	1	31	21	0	0	0	0	1	0	345	41	12.81	2.45	9	13	13	9	6	0
DEC	51.5	33.3	42.4	74	12	24	30	0	0	0	0	14	0	692	0	3.15	1.12	14	7	6	3	1	0
ANNUAL			67.5	109		24		0	103	0	0	27	0	1911	2911	49.82	3.55		82	71	36	17	0

M - indicates that daily observations are missing from the records

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* - indicates that the data is preliminary and is NOT quality controlled

This summary is provided by the Southern Regional Climate Center (SRCC) and the Louisiana Office of State Climatology (LOSC). The SRCC/LOSC is solely responsible for these data.

Station: ALEXANDRIA State: LA Index No: 16-0098-05 MONTHLY CLIMATE SUMMARY: 1992 - 2002

		Monthly Temperatures			Monthly Extremes				Number of Days Daily Max T				Number of Days Daily Min T				Degree Days		Monthly Prec	One Day Maximum		Number of Days Rain	Number of Days with PREC >=			
	Month	MAX	MIN	AVG	HI	Dt	LO	Dt	msg	>=90	<=32		msg	<=32	<=0		HDD	CDD	Total	Total	Dt	Days	0.1	0.5	1.0	msg
1992	JAN	54.5	35.6	45.1	73	31	20	2	0	0	0		0	13	0		610	0	6.31	2.00	19	9	9	4	2	0
	FEB	66.8	44.9	55.9	80	16	30	10	0	0	0		0	7	0		280	30	4.10	1.96	27	8	5	2	2	0
	MAR	63.5	45.7	54.6	76	23	38	10	0	0	0		0	0	0		317	0	10.64	2.80	2	14	12	8	5	0
	APR	80.6	60.9	70.8	86	10	44	18	0	0	0		0	0	0		31	212	2.05	1.30	24	4	3	2	1	0
	MAY	85.2	64.8	75.0	90	29	54	23	0	2	0		0	0	0		0	318	1.96	0.87	13	5	4	2	0	0
	JUN	86.5	69.4	78.0	92	3	63	23	0	8	0		0	0	0		0	396	11.17	3.25	30	16	14	6	3	0
	JUL	92.5	74.7	83.6	97	13	70	1	0	25	0		0	0	0		0	583	1.62	1.19	30	4	3	1	1	0
	AUG	91.7	73.5	82.6	97	1	64	19	0	24	0		0	0	0		0	553	3.91	1.58	20	10	8	3	1	0
	SEP	85.5	66.8	76.2	92	6	49	28	0	8	0		0	0	0		6	345	6.76	2.02	9	13	7	5	3	0
	OCT	76.4	52.8	64.6	86	25	38	29	0	0	0		0	0	0		95	92	5.45	2.50	13	6	6	3	2	0
	NOV	73.6	49.2	61.4	83	4	33	21	0	0	0		0	0	0		126	25	10.29	4.40	29	5	5	3	3	0
	DEC	64.6	43.7	54.2	77	7	29	27	0	0	0		0	3	0		351	23	5.58	1.65	14	8	7	4	2	0
	ANNUAL			66.8	97		20		0	67	0		0	23	0		1816	2577	69.84	4.40		102	83	43	25	0
2002	JANZ	61.0	40.5	50.8	82	31	23	4	0	0	0		0	9	0		461	27	2.96	1.14	25	7	6	2	1	0
	FEB	59.9	37.5	48.7	81	1	25	27	0	0	0		0	4	0		450	0	5.12	1.85	6	6	6	3	3	0
	MAR	68.3	47.1	57.7	84	16	24	4	0	0	0		0	5	0		280	62	7.19	2.28	2	7	7	5	2	0
	APR	78.4	60.9	69.7	90	30	45	5	0	1	0		0	0	0		44	190	3.65	1.95	8	2	2	2	2	0
	MAY	84.1	64.5	74.3	91	3	50	19	0	5	0		0	0	0		9	306	4.37	1.80	30	5	5	2	2	0
	JUN	88.5	70.6	79.6	94	7	64	16	0	14	0		0	0	0		0	442	2.83	0.86	27	5	5	3	0	0
	JUL	92.5	73.5	83.0	99	8	71	12	0	25	0		0	0	0		0	562	4.40	1.48	12	9	6	4	1	0
	AUG	91.7	73.4	82.6	98	3	70	10	0	25	0		0	0	0		0	552	2.34	0.88	16	9	5	2	0	0
	SEP	88.5	70.5	79.5	99	14	62	24	0	12	0		0	0	0		0	441	3.31	1.90	20	8	4	2	1	0
	OCT	76.3	62.3	69.3	90	5	48	16	0	2	0		0	0	0		29	170	16.05	4.95	4	17	14	10	5	0
	NOV	65.8	45.1	55.5	85	11	33	28	0	0	0		0	0	0		294	13	8.03	4.30	4	6	5	2	2	0
	DEC	60.3	40.3	50.3	77	19	29	7	0	0	0		0	5	0		456	5	7.97	2.08	5	6	6	5	5	0
	ANNUALZ			66.8	99		23		0	84	0		0	23	0		2023	2770	68.22	4.95		87	71	42	24	0

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NATIONAL CLIMATIC DATA CENTER NORMALS: 1971-2000

mmary provided by: SOUTHERN REGIONAL CLIMATE CENTER
LOUISIANA STATE UNIVERSITY

STN NAME : ALEXANDRIA INTL AP
STN ID : 160098
STN LAT : 31.32
STN LON : -92.47
STN ELEV : 87 ft
STN OBTIME : 0800

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Prcp	6.16	4.78	5.78	4.94	5.35	4.88	4.23	4.35	4.00	4.82	5.76	6.39
(Sum)	6.16	10.94	16.72	21.66	27.01	31.89	36.12	40.47	44.47	49.29	55.05	61.44
Max T	58.1	62.9	70.2	76.9	84.1	90.1	92.8	92.9	88.2	79.5	68.9	60.8
Min T	38.0	41.3	48.9	55.5	64.3	71.1	73.8	73.1	68.1	56.5	47.7	40.5
Avg T	48.1	52.1	59.6	66.2	74.2	80.6	83.3	83.0	78.2	68.0	58.3	50.7
HDD	534	368	197	64	5	0	0	0	0	49	235	456
(Sum)	1274	1642	1839	1903	1908	1908	0	0	0	49	284	740
CDD	3	7	27	100	289	468	568	558	394	142	35	11
(Sum)	3	10	37	137	426	894	1462	2020	2414	2556	2591	2602

	ANNUAL	Data Type	Units
··x T	77.1	Mean Maximum Temperature	degrees F
n T	56.6	Mean Minimum Temperature	degrees F
g T	66.9	Mean Average Temperature	degrees F
Prcp	61.44	Mean Total Precipitation	inches
HDD	1908	Mean Heating Degree Days	degrees F
CDD	2602	Mean Cooling Degree Days	degrees F

Note: Summation values (Sum) refer to the entries above the sum.
Prcp and CDD sums are calculated from January-December.
HDD sums are calculated from July-June.
- refers to a missing value

PAN EVAPORATION DATA: Monthly Summary (inches) LOSC/SRCC August 2000

Station: LSU-RED RIVER Res Sta

YEAR:	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1977:	M	3.69E	4.90	6.03E	8.19E	8.33	8.95E	6.73E	5.68	4.40	2.68	2.74E	-
1978:	M	M	4.43E	7.24	7.74E	9.08	9.40	8.46E	4.54	4.75	2.07E	M	-
1979:	M	M	4.50	5.01E	6.34E	7.90	7.10E	7.25	5.63E	5.28	2.89E	M	-
1980:	1.49E	M	3.64E	5.86E	5.83	8.69	9.70	9.07	6.73	4.83	2.63E	M	-
1981:	M	M	4.71E	5.61	6.56	7.81E	8.18	7.20	5.50	3.57E	2.46E	2.85E	-
1982:	M	1.96E	3.41E	4.06	7.19	7.30	7.54	7.27	6.28	3.66	2.11	1.86E	-
1983:	M	2.52E	4.31	4.50	6.17	6.52	7.22	7.55	6.00	4.18	2.88E	M	-
1984:	M	3.44E	4.05E	6.50	7.33	7.57	7.37	6.59	5.61	3.13	2.53E	2.09E	-
1985:	M	M	3.86	6.23	6.89	8.74	8.16E	8.04	6.20	3.24E	2.01	M	-
1986:	M	3.19E	6.04E	5.85E	6.43	6.11E	8.83	7.72E	5.47	3.34E	1.86E	1.49E	-
1987:	M	1.85E	4.51E	6.91	6.24	7.10	7.68E	8.21	5.63	4.99	2.49	M	-
1988:	M	M	4.43E	5.40	8.37	8.68	8.20E	7.16E	5.50	3.76	3.12	2.00E	-
1989:	1.43E	M	3.61E	5.97	6.66E	5.97E	6.58E	6.59	5.23	4.72	3.11E	M	-
1990:	1.92E	3.07	3.40E	5.09E	M	8.36E	7.68	7.54	6.24	4.13	2.72E	M	-
1991:	M	2.13E	4.95	4.61E	5.66E	7.17	8.31	6.55E	5.05	4.72E	M	1.79E	-
1992:	1.93E	2.47E	4.09E	5.45E	5.61	7.05E	8.13	7.38	6.23	4.76E	2.79E	1.65E	57.54
1993:	1.90E	2.56E	4.08E	5.40E	6.45	7.70E	9.74	8.16	6.16	3.74E	2.19E	2.14E	60.22
1994:	2.27E	2.49E	4.34E	5.91	5.98	7.75	8.48E	7.55	6.66E	3.57E	2.80	1.70E	59.50
1995:	2.84E	3.09E	3.81E	5.54E	6.55	8.58	8.76	9.04	6.14	4.92	3.45E	M	-
1996:	M	4.82E	6.19E	6.80	9.00	7.18E	7.68E	6.59	5.57E	4.09	2.37E	M	-
1997:	M	2.42E	4.13E	5.08E	6.19	6.82	8.73	7.71	6.12	4.60E	2.34E	2.22E	-
1998:	1.93E	3.02E	5.47E	6.35	8.22	11.44	11.26	8.41	7.25E	4.11	1.89	2.12E	71.47
1999:	M	3.40E	4.27	6.82E	7.73	7.44E	9.20	9.87	6.45	4.74	3.36	3.00E	-
2000:	3.19E	3.89E	4.68	5.83E	8.47E	7.61	9.59E	10.28	7.41	4.83	2.48	M	-
Mean:	2.10	2.94	4.41	5.75	6.95	7.79	8.44	7.79	5.97	4.25	2.58	2.13	61.10
n :	9	17	24	24	23	24	24	24	24	24	23	13	
Monthly Extremes --													
MAX:	3.19	4.82	6.19	7.24	9.00	11.44	11.26	10.28	7.41	5.28	3.45	3.00	
MIN:	1.43	1.85	3.40	4.06	5.61	5.97	6.58	6.55	4.54	3.13	1.86	1.49	

Annual Average is the sum of the monthly mean values

E : Includes ESTIMATED daily values in the monthly total
M : MISSING -- No monthly total is reported if 10 or more daily observations are missing
- : No annual total is reported if any month is coded as missing
n : No. months with no missing data (includes months with E)

PAN EVAPORATION DATA: Monthly Summary (inches) LOSC/SRCC August 2000

Station: LSU-CALHOUN Res Sta

YEAR:	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1961:	M	2.82E	6.03E	6.54E	7.72E	M	7.77E	7.03	5.51E	4.30	1.95E	2.16E	-
1962:	M	3.40E	5.11E	5.43E	8.31E	7.08E	8.15	8.69E	5.58	4.72	2.83E	2.13E	-
1963:	1.59E	2.93E	6.30	6.01	8.49	8.85	7.61E	7.88	5.59E	5.28	3.61E	M	-
1964:	M	2.96E	4.97E	5.80E	7.51M	7.76E	9.45	7.34	5.73E	4.36E	M	1.96E	-
1965:	2.11M	2.64E	3.47E	5.98	6.40	7.48E	8.12	7.27E	6.03E	4.35	2.50E	1.87E	-
1966:	M	2.36E	5.03E	5.74	6.83	8.58	8.26E	6.77	5.06	4.54	3.02E	1.77E	-
1967:	1.68E	2.53E	5.18	5.13E	7.27E	7.36	6.64	7.04	5.00	5.84	2.65E	1.72E	58.04
1968:	M	2.67E	4.24E	5.35E	6.26	7.03	7.52	6.54E	5.19	4.39	2.80E	2.57E	-
1969:	2.23E	3.89E	4.68E	5.27	6.66	8.13	8.32	8.72	5.91	4.75E	2.83E	M	-
1970:	M	M	3.83E	5.21	7.55E	7.16	7.10E	6.91	6.08	3.74E	2.86E	M	-
1971:	M	M	4.75E	6.11E	5.91M	7.83	6.51E	6.61	5.01E	4.20	3.36E	1.71E	-
1972:	M	M	5.27E	5.93	7.01	6.80	7.23	7.33	5.66E	3.82E	2.36E	M	-
1973:	M	M	3.63E	4.52E	6.74	6.70E	7.12	6.77	5.33E	3.95E	2.45E	M	-
1974:	1.76E	3.30E	4.81E	6.24E	6.06E	6.71E	7.77E	6.31E	3.76	3.75E	2.55E	M	-
1975:	M	2.44E	3.87E	4.48E	5.64E	6.77E	7.15E	5.87E	5.35	3.90E	M	M	-
1976:	M	4.11E	3.97	5.52	6.09	6.90E	7.19E	7.66	4.57E	3.92E	2.39E	2.23E	-
1977:	M	3.33E	5.11E	5.78	7.25	9.15E	7.07E	6.12	5.49	4.07	2.36E	M	-
1978:	M	M	4.26	6.49	7.17E	7.68	8.77	8.03E	4.89E	4.56	2.04E	1.91E	-
1979:	M	M	4.61E	4.74E	5.63E	6.77E	6.97	6.88	5.98E	5.18	2.97E	M	-
1980:	1.36E	M	3.80E	5.42E	5.28E	7.44E	9.22	9.21E	6.98E	4.77E	2.26E	M	-
1981:	M	2.45E	4.40E	5.53	5.93E	7.03E	7.53	6.82E	5.91	3.79E	2.47	1.95M	-
1982:	M	M	3.97	4.46E	7.00	M	8.06E	6.82	6.38	4.03E	2.10E	M	-
1983:	1.55E	2.52E	4.96E	4.98	6.48E	6.09	8.12E	7.67E	5.82	4.63	3.35E	M	-
1984:	M	3.69E	5.06M	6.23E	7.17E	7.32E	7.49E	6.50E	5.87E	3.20E	3.04E	2.16E	-
1985:	M	M	4.32E	6.14E	6.78E	8.68E	7.79E	7.88	6.41E	3.39E	2.24E	2.05E	-
1986:	2.81E	3.26E	6.15E	6.63E	6.59E	6.03E	8.64	7.98E	5.68E	3.30M	2.31E	1.02E	-
1987:	M	M	4.90E	6.93E	6.19	7.67E	7.75	7.80E	6.14E	5.43	3.29E	M	-
1988:	M	M	7.41E	6.26E	8.63E	8.56E	7.51E	7.61	5.76E	4.09E	3.58	2.48E	-
1989:	M	M	M	6.29	7.20E	6.62E	6.65E	6.67	5.71	4.60	3.61E	M	-
1990:	M	3.63E	4.12E	5.68	6.37E	8.45E	8.65	7.67E	6.03	4.53	3.35E	M	-
1991:	M	M	4.85E	4.86E	5.23E	6.48	8.07E	6.50	5.29E	4.15E	M	1.86	-
1992:	M	4.81E	4.54E	5.60E	6.53E	7.06E	7.04E	6.02E	5.42	4.91E	2.97E	M	-
1993:	2.10E	3.20	4.67E	5.96E	6.93E	6.77E	8.35E	7.29E	6.92E	3.96	2.47E	2.35E	60.97
1994:	M	2.56E	4.20E	M	5.94E	7.09E	7.55E	7.82E	5.53E	M	2.70E	1.89E	-
1995:	2.81E	3.05E	4.55E	6.25E	6.12E	7.87E	8.41E	7.84E	6.10E	5.14E	3.07E	M	-
1996:	M	M	4.98E	6.44E	7.47E	7.11E	7.87E	6.20E	5.62E	3.66	2.30E	M	-
1997:	M	M	4.41E	5.96E	6.54E	6.60	8.14	7.18E	6.06E	4.35E	M	1.68E	-
1998:	M	3.07E	5.51E	5.65E	6.57	9.30E	8.38	7.20E	6.43E	3.80E	3.79E	M	-
1999:	M	3.05	4.81E	6.18E	6.44	7.17E	7.83	8.97	6.03	4.74E	3.32E	2.60E	-
2000:	2.95E	3.90E	5.43E	5.62E	7.55E	7.09E	8.80	9.18E	6.66	4.52E	M	M	-
Mean:	2.08	3.14	4.77	5.73	6.74	7.40	7.81	7.32	5.71	4.35	2.79	2.01	59.85
n :	10	25	38	39	38	38	40	40	40	38	35	19	
Monthly Extremes --													
MAX:	2.95	4.81	7.41	6.93	8.63	9.30	9.45	9.21	6.98	5.84	3.79	2.60	
MIN:	1.36	2.36	3.47	4.46	5.23	6.03	6.51	5.87	3.76	3.20	1.95	1.02	

Annual Average is the sum of the monthly mean values

E : Includes ESTIMATED daily values in the monthly total

M : MISSING -- No monthly total is reported if 10 or more daily observations are missing

- : No annual total is reported if any month is coded as missing

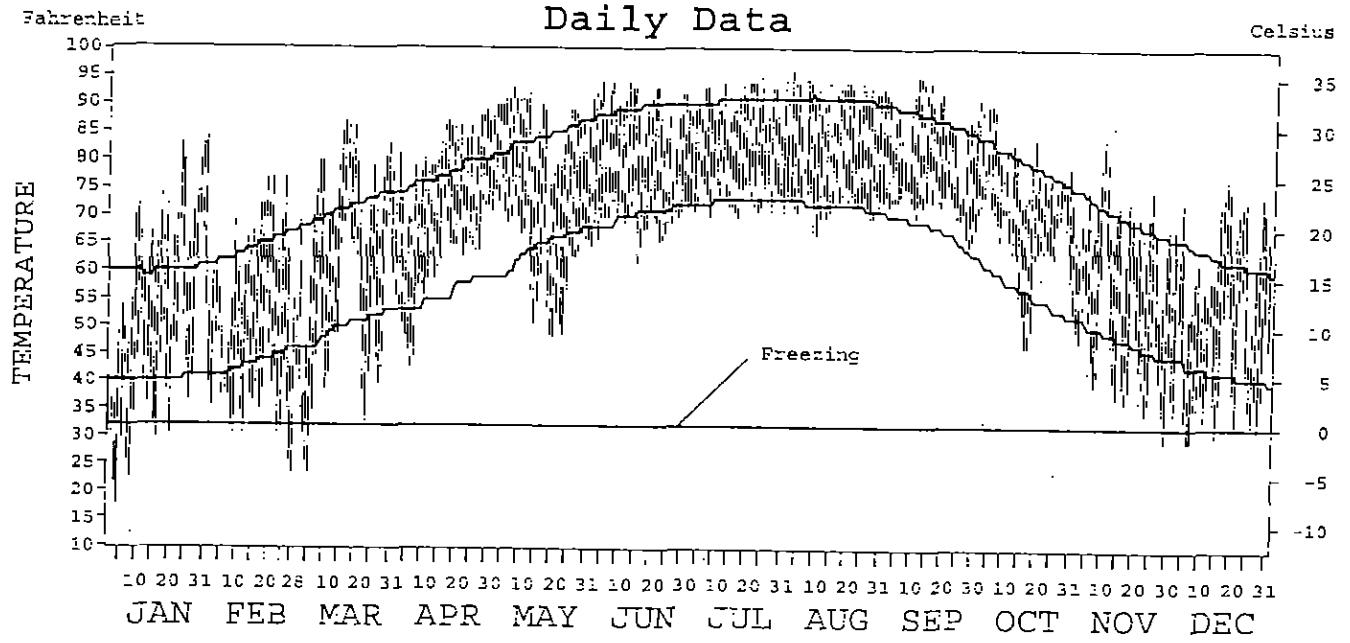
n : No. months with no missing data (includes months with E)

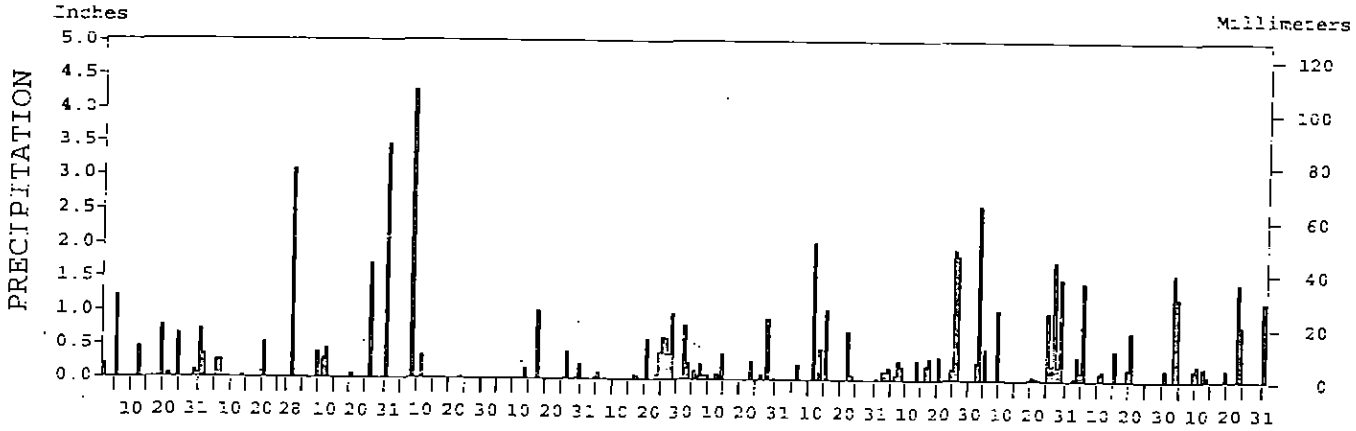
2002 LOCAL CLIMATOLOGICAL DATA
ANNUAL SUMMARY WITH COMPARATIVE DATA

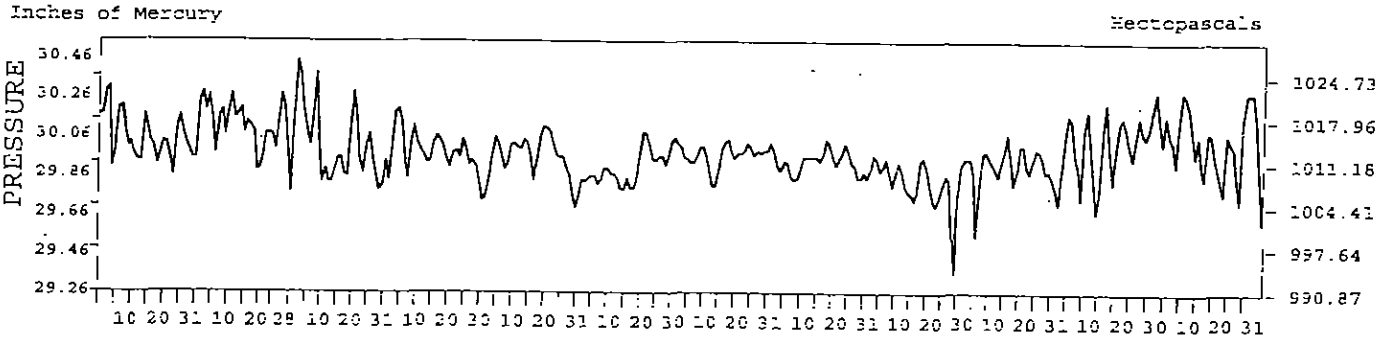
ISSN 0198-2273

BATON ROUGE,
LOUISANA (BTR)

Daily Data







I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC DATA CENTER.

Thomas R Karl

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION | NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE | NATIONAL CLIMATIC DATA CENTER ASHEVILLE, NORTH CAROLINA | DIRECTOR NATIONAL CLIMATIC DATA CENTER

METEOROLOGICAL DATA FOR 2002

BATON ROUGE, LA (BTR)

LATITUDE: 30° 32′ 14″ N | LONGITUDE: 91° 08′ 49″ W | ELEVATION (FT): GRND: 67 BARO: 70 | TIME ZONE: CENTRAL (UTC - 6) | WBAN: 13970

	ELEMENT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	MEAN DAILY MAXIMUM	64.0	62.2	72.3	80.7	86.2	89.6	90.9	91.4	87.6	79.2	67.7	63.2	77.9
	HIGHEST DAILY MAXIMUM	84	77	87	89	93	94	94	96	95	91	84	77	96
	DATE OF OCCURRENCE	31	25-	16	29	11-	12-	22+	02	12+	01	10	18	AUG 02
	MEAN DAILY MINIMUM	41.2	38.3	48.9	60.4	63.0	69.1	72.5	71.9	71.6	64.5	46.3	40.8	57.4
	LOWEST DAILY MINIMUM	18	24	24	43	47	62	70	67	65	47	30	29	18
	DATE OF OCCURRENCE	04	28	05	06	20	15	17+	10-	28-	17+	29	07	JAN 04
	AVERAGE DRY BULB	52.6	50.3	60.6	70.6	74.6	79.4	81.7	81.7	79.6	71.9	57.0	52.0	67.7
	MEAN WET BULB	49.1	44.1	55.3	64.7	67.6	72.4	75.3	74.6	73.6	67.0	52.9	46.1	62.1
	MEAN DEW POINT	44.5	36.4	50.1	60.8	63.8	69.4	73.2	72.2	71.5	64.5	49.1	44.0	58.3
	NUMBER OF DAYS WITH:													
	MAXIMUM ≥ 90°	0	0	0	0	12	19	20	26	14	3	0	0	94
	MAXIMUM ≤ 32°	0	0	0	0	0	0	0	0	0	0	0	0	0
	MINIMUM ≤ 32°	10	7	3	0	0	0	0	0	0	0	1	4	25
	MINIMUM ≤ 0°	0	0	0	0	0	0	0	0	0	0	0	0	0
H/C	HEATING DEGREE DAYS	416	408	225	29	8	0	0	0	0	13	255	396	1753
	COOLING DEGREE DAYS	39	2	94	204	312	439	524	526	445	233	25	2	2845
RH	MEAN (PERCENT)	76	68	72	75	73	77	81	79	82	81	78	77	76
	HOUR 00 LST	86	78	83	84	87	89	93	91	92	88	87	86	86
	HOUR 06 LST	87	81	87	91	93	92	95	94	94	90	90	89	90
	HOUR 12 LST	64	49	59	61	52	55	65	60	66	69	62	63	61
	HOUR 18 LST	65	50	58	63	60	66	73	71	79	81	76	72	68
S	PERCENT POSSIBLE SUNSHINE													
W/O	NUMBER OF DAYS WITH:													
	HEAVY FOG(VISBY ≤ 1/4 MI)	3	0	3	4	0	2	1	0	2	2	5	1	23
	THUNDERSTORMS	0	1	5	2	5	13	14	10	4	4	3	3	64
CLOUDINESS	SUNRISE-SUNSET: (OKTAS)													
	CEILOMETER (≤ 12,000 FT.)													
	SATELLITE (> 12,000 FT.)													
	MIDNIGHT-MIDNIGHT: (OKTAS)													
	CEILOMETER (≤ 12,000 FT.)													
	SATELLITE (> 12,000 FT.)													
	NUMBER OF DAYS WITH:													
	CLEAR													
	PARTLY CLOUDY													
	CLOUDY													
PR	MEAN STATION PRESS. (IN.)	30.05	30.12	30.01	29.98	29.94	29.89	29.96	29.92	29.82	29.90	30.04	30.02	29.97
	MEAN SEA-LEVEL PRESS. (IN.)	30.12	30.20	30.09	30.06	30.02	29.97	30.04	30.00	29.89	29.98	30.11	30.10	30.05
WINDS	RESULTANT SPEED (MPH)	1.7	1.4	3.2	2.3	1.6	1.5	0.6	1.1	1.6	1.9	0.5	0.8	1.0
	RES. DIR. (TENS OF DEGS.)	15	05	15	19	16	12	22	05	05	11	10	17	13
	MEAN SPEED (MPH)	6.5	6.6	8.6	6.7	7.2	4.8	3.6	4.4	5.6	5.3	5.5	6.6	6.0
	PREVAIL.DIR.(TENS OF DEGS.)	13	35	18	19	20	09	07	07	07	10	36	19	09
	MAXIMUM 2-MINUTE WIND:													
	SPEED (MPH)	30	29	35	31	32	30	29	30	33	37	28	60	60
	DIR. (TENS OF DEGS.)	23	18	26	14	27	19	07	16	21	15	21	29	29
	DATE OF OCCURRENCE	24	19	31	08	17	28	22	16	20	03	10	31	DEC 31
	MAXIMUM 5-SECOND WIND:													
	SPEED (MPH)	37	35	44	38	38	37	37	40	40	47	35	78	78
	DIR. (TENS OF DEGS.)	23	18	26	13	26	23	08	17	21	16	21	28	28
	DATE OF OCCURRENCE	24	19	31	08	17	27	22	16	20	03	10	31	DEC 31
PRECIPITATION	WATER EQUIVALENT:													
	TOTAL (IN.)	4.28	1.44	9.43	4.64	1.63	3.94	3.38	4.63	6.20	9.30	3.76	7.15	59.98
	GREATEST 24-HOUR (IN.)	1.21	0.53	3.46	4.28	1.01	1.15	0.92	2.03	3.07	2.81	1.46	2.35	4.28
	DATE OF OCCURRENCE	05	20	31	06	17	25-26	28	11	25-26	02-03	04-05	03-04	APR 08
	NUMBER OF DAYS WITH:													
	PRECIPITATION ≥ 0.01	11	5	8	3	6	14	15	9	16	17	10	11	125
	PRECIPITATION ≥ 0.10	7	4	6	2	4	7	7	5	12	9	9	9	81
	PRECIPITATION ≥ 1.00	1	0	3	1	1	0	0	2	2	5	1	4	20
SNOWFALL	SNOW,ICE PELLETS,HAIL:													
	TOTAL (IN.)													
	GREATEST 24-HOUR (IN.)													
	DATE OF OCCURRENCE													
	MAXIMUM SNOW DEPTH (IN.)													
	DATE OF OCCURRENCE													
	NUMBER OF DAYS WITH:													
	SNOWFALL ≥ 1.0													

NORMALS, MEANS, AND EXTREMES

BATON ROUGE, LA (BTR)

LATITUDE: 30° 32' 14" N LONGITUDE: 91° 08' 49" W ELEVATION (FT): GRND: 67 BARO: 70 TIME ZONE: CENTRAL (UTC + 6) WBAN: 13970

	ELEMENT	POR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	NORMAL DAILY MAXIMUM	30	60.0	63.9	71.0	77.3	84.0	89.2	90.7	90.9	87.4	79.7	70.1	62.8	77.3
	MEAN DAILY MAXIMUM	48	60.8	64.5	71.5	78.9	85.1	90.1	91.5	91.2	87.5	79.9	70.5	63.6	77.9
	HIGHEST DAILY MAXIMUM	51	84	85	91	92	98	103	101	105	104	94	87	85	105
	YEAR OF OCCURRENCE		2003	1989	1963	1987	1953	1954	1960	2000	2000	1986	1986	1982	AUG 2000
	MEAN OF EXTREME MAXS.	54	77.1	79.2	83.8	87.4	92.2	95.5	96.2	96.5	93.9	89.2	83.4	79.2	87.8
	NORMAL DAILY MINIMUM	30	40.2	43.1	49.6	55.8	64.1	70.2	72.7	71.9	67.5	56.4	47.9	42.1	56.8
	MEAN DAILY MINIMUM	48	40.3	43.4	49.5	57.4	64.6	70.5	73.0	72.4	68.4	57.1	47.9	42.3	57.2
	LOWEST DAILY MINIMUM	51	9	15	20	32	44	53	58	59	43	30	21	8	8
	YEAR OF OCCURRENCE		1985	1996	1980	1987	1954	1984	1967	1992	1967	1993	1976	1989	DEC 1989
	MEAN OF EXTREME MINS.	54	23.3	26.6	32.4	41.6	52.2	62.1	68.5	66.3	55.3	41.0	30.9	24.8	43.8
	NORMAL DRY BULB	30	49.8	53.1	61.3	68.9	75.3	80.5	82.3	81.9	78.1	68.6	60.0	52.9	67.7
	MEAN DRY BULB	54	51.0	54.3	60.6	68.0	74.9	80.5	82.1	81.8	77.8	68.5	59.1	53.1	67.6
	MEAN WET BULB	51	46.7	49.1	54.4	61.5	67.9	73.0	74.9	74.5	70.8	61.8	54.0	48.7	61.4
	MEAN DEW POINT	51	42.0	43.8	49.2	57.0	64.3	69.9	73.4	72.0	68.0	57.7	49.6	43.9	57.5
	NORMAL NO. DAYS WITH:														
	MAXIMUM ≥ 90°	30	0.0	0.0	*	0.4	5.5	18.5	23.4	21.7	11.5	2.0	0.0	0.0	83.0
	MAXIMUM ≤ 32°	30	0.2	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4
	MINIMUM ≤ 32°	30	9.3	5.1	1.1	*	0.0	0.0	0.0	0.0	0.0	0.0	1.6	6.4	23.5
	MINIMUM ≤ 0°	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H/C	NORMAL HEATING DEG. DAYS	30	457	326	185	57	4	0	0	0	2	49	212	397	1689
	NORMAL COOLING DEG. DAYS	30	11	15	55	119	298	457	534	523	389	157	48	22	2628
RH	NORMAL (PERCENT)	30	74	71	70	71	72	74	77	78	77	73	75	75	74
	HOUR 00 LST	30	81	78	79	82	84	86	87	88	87	85	85	82	84
	HOUR 06 LST	30	85	84	86	88	90	91	91	92	91	88	88	86	88
	HOUR 12 LST	30	64	59	57	55	56	59	62	62	60	54	58	62	59
	HOUR 18 LST	30	66	60	58	58	60	64	69	70	70	65	68	68	65
S	PERCENT POSSIBLE SUNSHINE														
W/O	MEAN NO. DAYS WITH:														
	HEAVY FOG(VISBY≤1/4 MI)	50	4.3	2.9	2.8	3.0	2.7	1.0	1.7	1.5	2.6	3.9	4.2	3.9	34.5
	THUNDERSTORMS	50	2.1	3.4	4.3	5.0	6.3	9.9	14.8	12.2	6.6	2.4	2.5	2.2	71.7
CLOUDINESS	MEAN:														
	SUNRISE-SUNSET (OKTAS)	2	6.4	6.4		5.6	5.6	4.4	4.8	2.8	3.2	4.0	4.8	6.4	
	MIDNIGHT-MIDNIGHT (OKTAS)	1	6.4	6.4		5.6	4.8	4.8	4.8	2.8	3.2	4.0	5.6	6.4	
	MEAN NO. DAYS WITH:														
	CLEAR	1	10.0	9.5	8.0	7.0	12.0	7.0	9.0	10.0	3.0	5.0	6.0	2.0	89.5
	PARTLY CLOUDY	1	3.5	5.5	3.0	6.0	6.5	17.5	7.0	6.0	2.0	3.0	3.0	2.0	67.0
	CLOUDY	1	14.5	15.0	7.5	9.0	16.5	10.0	9.0	4.0		8.0	7.0	5.0	
PR	MEAN STATION PRESSURE(IN)	29	30.08	30.03	29.96	29.94	29.90	29.92	29.96	29.95	29.93	30.00	30.04	30.07	29.98
	MEAN SEA-LEVEL PRES. (IN)	51	30.16	30.11	30.04	30.01	29.95	29.96	30.03	30.01	30.00	30.06	30.11	30.14	30.05
WINDS	MEAN SPEED (MPH)	46	8.6	8.9	9.0	8.6	7.5	6.6	5.9	5.5	6.3	6.5	7.5	8.0	7.4
	PREVAIL.DIR(TENS OF DEGS)	31	12	36	18	16	18	18	27	07	05	06	12	11	11
	MAXIMUM 2-MINUTE:														
	SPEED (MPH)	9	39	39	38	32	39	36	37	37	35	37	32	60	60
	DIR. (TENS OF DEGS)		24	17	27	23	22	21	26	07	21	15	22	29	29
	YEAR OF OCCURRENCE		1999	1998	1996	1997	1999	1996	1997	2000	2002	2002	1997	2002	DEC 2002
	MAXIMUM 5-SECOND:														
	SPEED (MPH)	9	47	51	49	39	52	46	47	48	41	47	44	78	78
	DIR. (TENS OF DEGS)		22	17	29	23	25	16	28	09	25	16	22	28	28
	YEAR OF OCCURRENCE		1999	1998	1996	1997	1999	1996	1997	2000	2001	2002	1997	2002	DEC 2002
PRECIPITATION	NORMAL (IN)	30	6.19	5.10	5.07	5.56	5.34	5.33	5.96	5.86	4.84	3.81	4.76	5.26	63.08
	MAXIMUM MONTHLY (IN)	51	14.94	14.51	12.73	14.84	14.67	23.18	10.95	14.48	13.95	14.48	13.55	15.94	23.18
	YEAR OF OCCURRENCE		1998	1966	1973	1980	1989	1989	1963	1987	1977	1984	1989	1982	JUN 1989
	MINIMUM MONTHLY (IN)	51	1.15	0.64	0.54	0.38	0.35	0.12	2.05	0.38	0.09	T	0.25	1.83	T
	YEAR OF OCCURRENCE		1971	2000	1955	1976	1998	1979	1962	1999	1953	1978	1967	1996	OCT 1979
	MAXIMUM IN 24 HOURS (IN)	51	9.02	4.72	6.07	12.08	4.96	9.97	4.26	8.31	6.31	8.38	7.29	8.28	12.08
	YEAR OF OCCURRENCE		1993	1979	1973	1967	1954	2001	1969	1987	1973	1964	1989	1982	APR 1967
	NORMAL NO. DAYS WITH:														
	PRECIPITATION ≥ 0.01	30	10.2	8.7	8.9	7.1	7.7	9.9	13.2	12.4	9.3	8.3	7.7	9.7	110.1
	PRECIPITATION ≥ 1.00	30	1.7	1.8	1.8	1.4	1.6	1.2	2.1	1.9	1.5	1.3	1.5	1.9	19.7
SNOWFALL	NORMAL (IN)	30	0.*	0.2	0.*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.*	0.*	0.2
	MAXIMUM MONTHLY (IN)	46	0.6	3.2	T	0.0	T	0.0	0.0	0.0	0.0	0.0	T	T	3.2
	YEAR OF OCCURRENCE		1973	1988	1993		1989						1976	1989	FEB 1988
	MAXIMUM IN 24 HOURS (IN)	45	0.5	3.2	T	0.0	T	0.0	0.0	0.0	0.0	0.0	T	T	3.2
	YEAR OF OCCURRENCE		1973	1988	1993		1989						1976	1989	FEB 1988
	MAXIMUM SNOW DEPTH (IN)	46	2	2	0	0	0	0	0	0	0	0	T	0	2
	YEAR OF OCCURRENCE		1949	1988									1976		FEB 1988
	NORMAL NO. DAYS WITH:														
	SNOWFALL ≥ 1.0	30	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1

PRECIPITATION (inches) 2002 BATON ROUGE, LA (BTR)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1973	4.01	3.64	13.73	10.10	5.60	2.99	4.34	4.92	13.08	1.89	7.44	8.29	79.03
1974	8.33	6.66	5.66	5.59	5.23	1.11	5.89	6.45	2.19	1.61	4.55	3.70	56.97
1975	7.77	1.42	4.49	10.18	5.49	5.11	9.30	11.69	3.54	2.58	2.16	2.37	66.10
1976	3.72	4.67	5.18	0.38	4.92	4.90	7.63	2.31	1.46	3.10	5.00	5.80	49.07
1977	6.50	3.89	4.85	7.10	3.97	1.46	6.35	13.31	13.95	3.08	10.35	2.92	77.70
1978	6.55	2.24	1.86	2.92	7.43	2.94	7.14	7.54	3.83	-.01	4.94	1.94	49.32
1979	6.25	10.83	4.26	11.48	5.37	0.12	8.76	4.94	3.55	2.47	5.06	2.82	65.91
1980	4.67	3.56	8.25	14.84	7.28	5.35	7.68	1.32	7.74	5.66	5.57	2.35	74.30
1981	1.20	7.07	1.74	3.09	4.47	4.70	4.25	4.46	3.95	1.42	1.51	5.35	43.21
1982	3.35	6.48	2.61	4.60	4.05	2.91	5.18	3.93	2.47	2.42	3.05	15.94	57.19
1983	6.25	4.63	5.39	12.75	6.17	12.25	3.39	8.39	4.47	1.55	4.33	8.06	77.63
1984	2.77	6.63	1.20	1.79	3.82	3.00	4.95	3.92	2.37	14.48	2.74	3.76	51.43
1985	4.56	5.95	4.15	1.61	2.72	4.13	8.85	6.92	6.31	10.08	0.42	4.58	60.38
1986	1.53	3.50	2.71	2.94	8.21	6.10	3.31	6.38	1.91	4.40	8.52	6.19	55.70
1987	7.04	7.97	6.02	1.40	4.23	4.48	6.42	14.48	0.78	1.54	3.78	3.89	62.03
1988	3.98	12.49	9.00	4.66	0.95	4.16	6.45	11.02	9.48	2.80	2.88	8.17	76.04
1989	4.02	1.51	4.64	2.34	14.67	23.19	6.25	5.16	4.51	2.18	13.55	6.31	88.32
1990	11.41	7.91	5.84	2.71	3.61	7.15	7.37	4.35	5.06	3.15	2.12	4.77	65.45
1991	9.69	7.85	3.21	9.18	10.63	5.21	5.29	10.67	6.31	4.64	2.70	2.36	77.74
1992	5.70	7.53	4.46	2.29	2.16	14.45	6.52	7.64	1.50	3.21	8.09	4.70	70.25
1993	13.35	2.82	5.36	11.58	2.18	3.14	4.48	4.29	1.46	5.49	3.76	3.29	61.20
1994	6.66	2.96	3.75	8.75	5.81	6.99	10.32	3.05	4.13	5.13	1.24	3.07	61.88
1995	7.27	3.56	10.70	9.55	10.82	2.34	2.36	5.34	2.70	3.10	8.16	8.99	74.89
1996	6.41	3.27	6.21	5.92	3.14	5.04	2.52	5.94	6.57	10.17	2.30	1.83	59.22
1997	6.04	7.98	3.43	9.51	7.46	7.93	4.71	4.26	1.18	3.49	6.06	6.32	68.27
1998	14.94	5.60	4.03	5.05	0.35	2.51	3.56	3.05	8.54	2.23	3.05	3.58	56.49
1999	5.48	1.78	5.39	0.64	5.49	6.67	5.97	0.38	4.08	7.04	0.87	5.27	49.06
2000	2.78	0.64	3.36	1.55	1.15	4.76	3.61	2.66	3.04	1.07	10.71	2.73	38.10
2001	4.00	1.83	7.35	0.55	0.83	21.36	3.20	5.77	7.11	5.49	0.58	4.25	62.32
2002	4.26	1.44	9.43	4.64	1.83	3.94	3.38	4.63	6.20	9.30	3.76	7.15	59.98
POR= 110 YRS	5.22	4.74	5.07	4.91	4.89	4.77	6.33	5.50	4.29	3.34	3.97	5.20	58.23

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AVERAGE TEMPERATURE (°F) 2002 BATON ROUGE, LA (BTR)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1973	49.3	51.2	65.2	65.5	74.1	81.0	84.4	80.9	79.9	73.3	66.2	52.9	68.7
1974	60.8	55.4	67.1	68.5	76.9	77.8	81.3	80.4	75.6	67.2	58.5	54.1	68.7
1975	55.7	57.1	60.5	66.5	75.4	79.6	81.4	81.0	74.7	69.0	59.7	51.0	67.6
1976	48.6	59.1	63.6	68.4	71.1	77.9	81.1	80.9	76.9	61.9	51.4	49.9	65.9
1977	41.6	53.1	62.7	67.9	75.6	82.5	83.3	81.3	79.7	66.8	61.4	52.7	67.4
1978	42.6	45.3	57.1	69.0	76.6	81.8	82.1	81.7	78.8	68.0	63.4	52.2	66.6
1979	42.7	50.1	60.5	68.8	72.1	79.1	81.5	80.9	76.0	68.0	54.9	50.0	65.4
1980	52.6	50.3	58.8	66.2	76.2	82.0	83.7	82.2	80.2	64.1	55.9	50.7	66.9
1981	46.2	52.8	59.1	73.0	71.9	81.7	83.6	82.6	76.3	66.4	62.2	51.8	67.4
1982	52.7	51.8	63.1	67.9	76.3	82.6	82.3	82.4	77.0	68.6	60.9	57.0	68.6
1983	48.7	51.4	57.3	62.6	72.6	77.0	82.0	82.2	75.2	68.0	58.9	46.5	65.2
1984	45.4	53.4	59.9	68.0	73.8	78.9	80.3	79.8	75.9	73.5	57.3	51.3	67.3
1985	43.8	50.4	64.9	69.7	74.0	80.2	80.7	82.0	76.5	72.1	66.3	48.6	67.4
1986	50.7	57.8	60.5	68.5	76.4	81.6	83.8	82.1	82.0	69.1	63.8	51.0	68.9
1987	49.0	55.0	58.7	65.7	76.9	79.7	82.4	83.1	77.5	64.3	60.5	57.4	67.5
1988	47.0	51.9	60.2	68.0	73.7	80.3	82.7	83.0	79.0	66.9	63.9	55.0	67.6
1989	58.7	53.7	63.2	67.4	76.5	79.9	82.0	82.5	77.2	67.9	60.9	44.6	67.9
1990	56.9	60.6	63.2	68.1	76.6	83.9	82.2	82.9	79.6	66.5	61.5	56.3	69.9
1991	50.9	56.7	63.1	70.9	77.2	81.6	83.5	82.1	77.6	70.7	55.7	57.1	68.9
1992	50.8	58.2	61.8	67.0	73.3	80.3	84.0	79.8	78.5	68.9	55.3	56.3	67.9
1993	54.3	54.4	58.9	63.8	71.0	79.9	82.3	82.8	78.0	67.0	55.6	50.3	66.5
1994	47.9	53.7	59.9	66.6	73.3	80.5	80.3	80.6	76.5	69.0	62.8	54.6	67.3
1995	51.3	55.0	61.8	68.2	76.9	78.7	83.1	83.5	78.9	68.7	57.8	53.1	68.1
1996	51.4	54.1	56.6	64.9	76.6	79.0	81.9	80.0	76.2	67.7	60.0	55.2	67.0
1997	51.2	54.9	64.2	62.4	72.9	79.0	82.5	81.2	78.5	68.0	55.7	49.8	66.7
1998	53.9	53.5	58.4	65.3	77.6	83.2	84.5	83.4	80.8	71.0	62.7	55.9	69.2
1999	55.9	58.6	59.3	71.6	74.5	80.3	81.6	85.1	76.1	67.6	59.0	52.3	68.5
2000	54.1	59.9	64.1	65.5	78.3	80.6	82.9	84.3	77.6	67.4	56.0	45.6	68.0
2001	47.7	55.2	56.6	70.6	74.3	78.0	81.7	81.0	75.9	64.8	63.1	55.0	67.3
2002	52.6	50.3	60.6	70.6	74.6	79.4	81.7	81.7	79.6	71.9	57.0	52.0	67.7
POR= 110 YRS	52.1	54.1	61.2	66.9	73.7	80.4	82.0	81.8	78.1	69.0	58.4	52.6	67.5

HEATING DEGREE DAYS (base 65°F) 2002 BATON ROUGE, LA (BTR)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1973-74	0	0	0	16	86	384	179	285	70	28	0	0	1050
1974-75	0	0	0	27	236	361	308	250	202	74	0	0	1458
1975-76	0	0	6	24	246	446	507	189	118	13	0	0	1549
1976-77	0	0	0	140	401	464	710	331	141	18	0	0	2205
1977-78	0	0	0	56	144	387	694	546	256	29	2	0	2116
1978-79	0	0	0	32	104	427	687	418	178	19	5	0	1870
1979-80	0	0	0	44	308	465	379	433	225	44	0	0	1898
1980-81	0	0	0	96	279	448	576	345	152	10	6	0	1952
1981-82	0	0	4	64	132	410	425	366	181	59	0	0	1641
1982-83	0	0	3	51	184	297	499	375	249	114	2	0	1774
1983-84	0	0	8	51	216	571	598	338	188	46	5	0	2021
1984-85	0	0	8	16	248	179	648	413	72	33	2	0	1619
1985-86	0	0	0	23	76	509	433	230	169	25	0	0	1465
1986-87	0	0	0	31	118	431	490	280	201	90	0	0	1641
1987-88	0	0	0	66	181	264	559	376	186	25	1	0	1660
1988-89	0	0	0	20	129	329	230	357	170	68	0	0	1299
1989-90	0	0	0	62	177	626	258	153	126	57	0	0	1459
1990-91	0	0	1	94	147	311	432	236	146	15	0	0	1384
1991-92	0	0	1	25	332	272	433	207	130	56	12	0	1469
1992-93	0	0	0	6	297	271	329	299	214	104	0	0	1520
1993-94	0	0	1	83	314	455	527	328	203	64	0	0	1975
1994-95	0	0	0	40	217	315	423	280	158	31	0	0	1364
1995-96	0	0	1	31	232	410	423	365	293	95	3	0	1853
1996-97	0	0	5	49	182	312	450	300	91	105	3	0	1497
1997-98	0	0	0	79	277	464	338	316	253	70	0	0	1797
1998-99	0	0	0	15	94	335	312	213	182	30	2	0	1183
1999-00	0	0	0	67	189	402	355	198	99	62	0	0	1372
2000-01	0	0	7	57	315	597	529	210	252	38	0	0	2005
2001-02	0	0	3	99	106	325	416	408	225	29	8	0	1619
2002-	0	0	0	13	258	396							

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COOLING DEGREE DAYS (base 65°F) 2002 BATON ROUGE, LA (BTR)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1973	0	2	32	113	292	486	607	499	455	252	128	15	2971
1974	57	21	142	141	380	390	511	485	329	103	49	33	2641
1975	30	36	68	126	329	446	515	500	302	156	94	16	2618
1976	2	25	82	123	195	394	506	501	367	51	2	0	2248
1977	0	4	77	111	337	535	573	513	447	121	42	12	2772
1978	8	0	18	129	371	512	567	526	424	131	63	32	2781
1979	1	6	44	141	233	430	521	501	338	144	14	6	2379
1980	0	15	40	84	352	514	586	539	461	75	15	10	2691
1981	0	7	17	227	226	509	581	553	350	176	56	4	2706
1982	49	1	130	152	359	536	546	547	370	170	66	56	2982
1983	0	0	14	48	243	368	533	538	325	152	39	4	2264
1984	0	7	38	141	286	423	480	468	343	256	22	69	2563
1985	0	10	76	148	291	459	492	533	352	248	121	11	2741
1986	0	35	36	136	359	503	592	536	517	164	89	5	2972
1987	3	4	14	116	376	447	548	568	364	53	51	33	2597
1988	7	4	44	121	275	467	555	564	428	88	102	21	2676
1989	42	47	119	148	365	453	534	550	373	157	62	0	2850
1990	17	36	81	155	366	572	543	563	445	150	52	46	3026
1991	2	12	92	201	386	504	577	537	385	209	59	36	3000
1992	0	17	38	126	274	463	593	469	412	135	31	9	2547
1993	6	5	33	75	192	452	543	560	398	152	41	5	2462
1994	4	19	52	180	262	472	482	488	352	170	62	5	2549
1995	8	9	68	137	377	418	572	583	425	159	29	52	2837
1996	8	54	40	101	370	428	529	472	344	135	41	14	2536
1997	29	23	72	32	255	426	548	510	414	180	5	2	2496
1998	2	0	56	86	395	552	612	580	484	211	31	61	3073
1999	35	42	11	241	304	465	523	629	339	152	17	16	2774
2000	23	55	79	82	418	476	560	606	392	136	54	0	2881
2001	0	54	4	210	294	398	524	504	339	99	54	22	2502
2002	39	2	94	204	312	439	524	526	445	233	25	2	2845

SNOWFALL (inches) 2002 BATON ROUGE, LA (BTR)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1973-74	0.0	0.0	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	0.0	0.0	T
1974-75	0.0	0.0	0.0	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	0.0	T
1975-76	0.0	0.0	0.0	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	0.0	T
1976-77	0.0	0.0	0.0	0.0	T	0.0	T	0.0	0.0	0.0	0.0	0.0	T
1977-78	0.0	0.0	0.0	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	0.0	T
1978-79	0.0	0.0	0.0	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	0.0	T
1979-80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	T	0.0	0.0	0.0	T
1980-81	0.0	0.0	0.0	0.0	0.0	0.0	T	T	0.0	0.0	0.0	0.0	T
1981-82	0.0	0.0	0.0	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	0.0	T
1982-83	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1983-84	0.0	0.0	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	0.0	0.0	T
1984-85	0.0	0.0	0.0	0.0	0.0	0.0	T	T	0.0	0.0	0.0	0.0	T
1985-86	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1986-87	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1987-88	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.0	0.0	3.2
1988-89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	T	T	0.0	T	0.0	T
1989-90	0.0	0.0	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	0.0	0.0	T
1990-91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1991-92	0.0	0.0	0.0	0.0	0.0	0.0	T	0.0	T	0.0	0.0	0.0	T
1992-93	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	T	0.0			
1993-94	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1994-95	0.0	0.0	0.0	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	0.0	T
1995-96	0.0	0.0	0.0	0.0	0.0		0.0						
1996-97													
1997-98													
1998-99													
1999-00													
2000-01													
2001-02													
2002-													
POR= 47 YRS	0.0	0.0	0.0	0.0	T	T	T	T	T	0.0	T	0.0	T

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REFERENCE NOTES:

PAGE 1:
THE TEMPERATURE GRAPH SHOWS NORMAL MAXIMUM AND NORMAL MINIMUM DAILY TEMPERATURES (SOLID CURVES) AND THE ACTUAL DAILY HIGH AND LOW TEMPERATURES (VERTICAL BARS).

PAGE 2 AND 3:
H/C INDICATES HEATING AND COOLING DEGREE DAYS.
RH INDICATES RELATIVE HUMIDITY
W/O INDICATES WEATHER AND OBSTRUCTIONS
S INDICATES SUNSHINE.
PR INDICATES PRESSURE.
CLOUDINESS ON PAGE 3 IS THE SUM OF THE CEILOMETER AND SATELLITE DATA NOT TO EXCEED EIGHT EIGHTHS(OKTAS).

GENERAL:
T INDICATES TRACE PRECIPITATION, AN AMOUNT GREATER THAN ZERO BUT LESS THAN THE LOWEST REPORTABLE VALUE.
+ INDICATES THE VALUE ALSO OCCURS ON EARLIER DATES.
BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA.
NORMALS ARE 30-YEAR AVERAGES (1961 - 1990).
ASOS INDICATES AUTOMATED SURFACE OBSERVING SYSTEM.
PM INDICATES THE LAST DAY OF THE PREVIOUS MONTH.
POR (PERIOD OF RECORD) BEGINS WITH THE JANUARY DATA MONTH AND IS THE NUMBER OF YEARS USED TO COMPUTE THE MEAN. INDIVIDUAL MONTHS WITHIN THE POR MAY BE MISSING.
WHEN THE POR FOR A NORMAL IS LESS THAN 30 YEARS, THE NORMAL IS PROVISIONAL AND IS BASED ON THE NUMBER OF YEARS INDICATED.
0.* OR * INDICATES THE VALUE OR MEAN-DAYS-WITH IS BETWEEN 0.00 AND 0.05.
CLOUDINESS FOR ASOS STATIONS DIFFERS FROM THE NON-ASOS OBSERVATION TAKEN BY A HUMAN OBSERVER. ASOS STATION CLOUDINESS IS BASED ON TIME-AVERAGED CEILOMETER DATA FOR CLOUDS AT OR BELOW 12,000 FEET AND ON SATELLITE DATA FOR CLOUDS ABOVE 12,000 FEET.
THE NUMBER OF DAYS WITH CLEAR, PARTLY CLOUDY, AND CLOUDY CONDITIONS FOR ASOS STATIONS IS THE SUM OF THE CEILOMETER AND SATELLITE DATA FOR THE SUNRISE TO SUNSET PERIOD.

GENERAL CONTINUED:
CLEAR INDICATES 0 - 2 OKTAS, PARTLY CLOUDY INDICATES 3 - 6 OKTAS, AND CLOUDY INDICATES 7 OR 8 OKTAS. WHEN AT LEAST ONE OF THE ELEMENTS (CEILOMETER OR SATELLITE) IS MISSING, THE DAILY CLOUDINESS IS NOT COMPUTED.
WIND DIRECTION IS RECORDED IN TENS OF DEGREES (2 DIGITS) CLOCKWISE FROM TRUE NORTH. "00" INDICATES CALM, "36" INDICATES TRUE NORTH.
RESULTANT WIND IS THE VECTOR AVERAGE OF THE SPEED AND DIRECTION.
AVERAGE TEMPERATURE IS THE SUM OF THE MEAN DAILY MAXIMUM AND MINIMUM TEMPERATURE DIVIDED BY 2.
SNOWFALL DATA COMPRISE ALL FORMS OF FROZEN PRECIPITATION, INCLUDING HAIL.
A HEATING (COOLING) DEGREE DAY IS THE DIFFERENCE BETWEEN THE AVERAGE DAILY TEMPERATURE AND 65° F.
DRY BULB IS THE TEMPERATURE OF THE AMBIENT AIR.
DEW POINT IS THE TEMPERATURE TO WHICH THE AIR MUST BE COOLED TO ACHIEVE 100 PERCENT RELATIVE HUMIDITY.
WET BULB IS THE TEMPERATURE THE AIR WOULD HAVE IF THE MOISTURE CONTENT WAS INCREASED TO 100 PERCENT RELATIVE HUMIDITY.

ON JULY 1, 1996, THE NATIONAL WEATHER SERVICE BEGAN USING THE "METAR" OBSERVATION CODE THAT WAS ALREADY EMPLOYED BY MOST OTHER NATIONS OF THE WORLD. THE MOST NOTICEABLE DIFFERENCE IN THIS ANNUAL PUBLICATION WILL BE THE CHANGE IN UNITS FROM TENTHS TO EIGHTS(OKTAS) FOR REPORTING THE AMOUNT OF SKY COVER.

2002
BATON ROUGE, LOUISANA (BTR)

Baton Rouge, the capital city, is located on the east side of the Mississippi River in the southeast section of the state, some 65 miles inland from the coast. The area is near the first evident relief north of the deltaic coastal plains. The NOAA National Weather Service Office is located at Ryan Airport, some 8 miles north of the downtown area. Elevations in East Baton Rouge Parish range from near 25 feet to more than 100 feet above sea level.

The general climate of Baton Rouge is humid subtropical, but the city is subject to significant polar influences during winter. Prevailing wind flow is from the southerly direction during much of the year. This maritime air from the Gulf of Mexico helps to temper summer heat, shorten winter cold spells, and provides abundant moisture and rainfall. Winds are usually rather light.

Rainfall is heavy and amounts are substantial in all seasons, with an early autumn low in September and October. Almost all rainfall is from brief convective showers. Occasionally during winter, slow moving cold fronts may produce rains lasting for a few days. Extremes of precipitation may occur in all seasons.

The winter months are normally mild with short cold spells. The typical pattern is, turning cold with rain on the first day, colder with clear skies on the second day, and warming on the third day. Freezing or sub-freezing temperatures occur several times annually, but temperatures nearly always rise above freezing during the day. The average date of the first freeze in the autumn is late November, and the average date of the last freeze in spring is late February, producing a mean freeze-free period of 273 days. Annual total snowfall averages only a fraction of an inch and many years pass with no measurable snow.

The summer months are consistently quite warm, but high temperatures rarely exceed 100 degrees. This is because of the high humidity of the maritime tropical air mass, the effects of cloudiness, and the scattered showers and thunderstorms which are a primary feature of the weather during these months. Scattered showers normally fall in the area on about one-half of the days in June, July, and August.

Except for three or four days per month, point rainfall totals are usually less than 0.5 inch. Summer relative humidity exceeds 80 percent for about 12 hours per day. High humidity may be experienced at any hour, but occurs mainly at night. Readings of 50 percent or less occur about two hours per day, usually in the afternoons. Temperatures in the spring are usually mild and pleasant and in the autumn they are generally delightful for outdoor activities.

Thunderstorms occur each month, most frequently in July and August. Severe local storms, including hailstorms, tornadoes, and local wind storms, are most frequent during the spring months. Large damaging hail very rarely occurs and tornadoes are unusual. Hurricane centers have occasionally passed very near Baton Rouge.

STATION LOCATION

BATON ROUGE, LOUISANA

LOCATION	Occupied From	Occupied To	Airline Distance and Direction from previous Location	LATITUDE NORTH	LONGITUDE WEST	ELEVATION ABOVE SEA LEVEL: Ground Temperature Site	ELEVATION ABOVE GROUND: Wind Instrument	Maximum Thermometers	Psychrometer	Sunshine Switch	Tipping Bucket Rain Gages	Weighing Rain Gage	8 Inch Rain Gage	Hygrothermometer	Automatic Observing Equipment *	REMARKS
*NOTES: AIRPORT Administration Building Municipal Airport	6/4/32	9/14/41	NA	30°27'	91°07'	56	60		4							Operated on scheduled flight basis to 9/15/41. Operated jointly by CAA and Army Air Force 9/15/41-5/11/42.
Harding Field	4/12/42	2/25/45	8 mi. N	30°32'	91°09'	64										USAF station established 5/12/42.
Harding Field Building 173	2/25/45	5/26/45	Unknown	30°32'	91°09'	68	25	4	4				3			USAF station closed and Weather Bureau office opened.
Harding Field Building 103	5/26/45	1/12/48	0.75mi. E	30°32'	91°05'	64	28	6	6				3			
Harding Field, Hangar	1/12/48	5/15/51	8035ft.S	30°32'	91°09'	64	65	55	55			46	46			
Terminal Building Harding Field - - Ryan Airport (Effective 3/10/54)	5/15/51	10/20/78	1000ft N	30°32'	91°09'	64	70 a20	19 f	19	NA	NA d4 g18	18 c4 g18	18 c4 g18	NA b4 e5	NA	a. Moved 1300' ESE 2/15/53 b. Commissioned 1300' ESE of thermometer site 8/4/53. c. Effective 2/13/67. d. Installed 2/25/67. e. Effective 4/67. f. Removed 1/7/70. g Moved to roof 8/4/73.
Nat. Wea. Service Bldg. Ryan Airport	10/20/78	05/01/93	3960 ft. ESE	30°32'	91°08'	64	h20 i32	NA	5	NA	4	4	4	5 j6	NA	h. Not moved 10/20/78. i. Relocated 10/2/85 j. Minor move & type change 10/2/85.
Ryan Airport	05/01/93	Present	NA	30°32'	91°09'	k67									S	ASOS commissioned 05/01/93 k. Ground elevation.

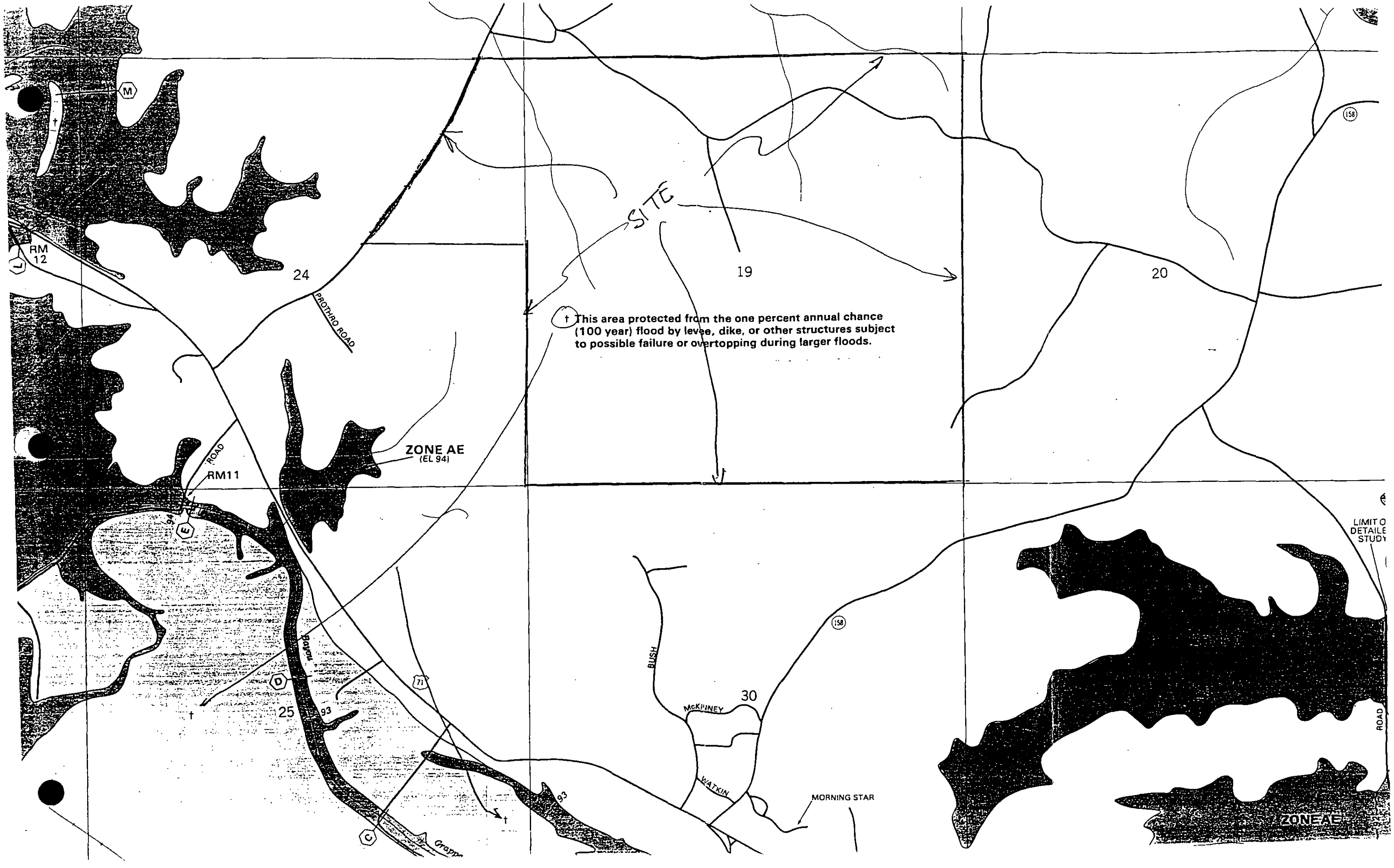
* TYPE

M = AMOS
C = AUTOB
S = ASOS
W = AWOS

* NOTES: For earlier station history see previous edition.

FEMA MAP

BEST COPY

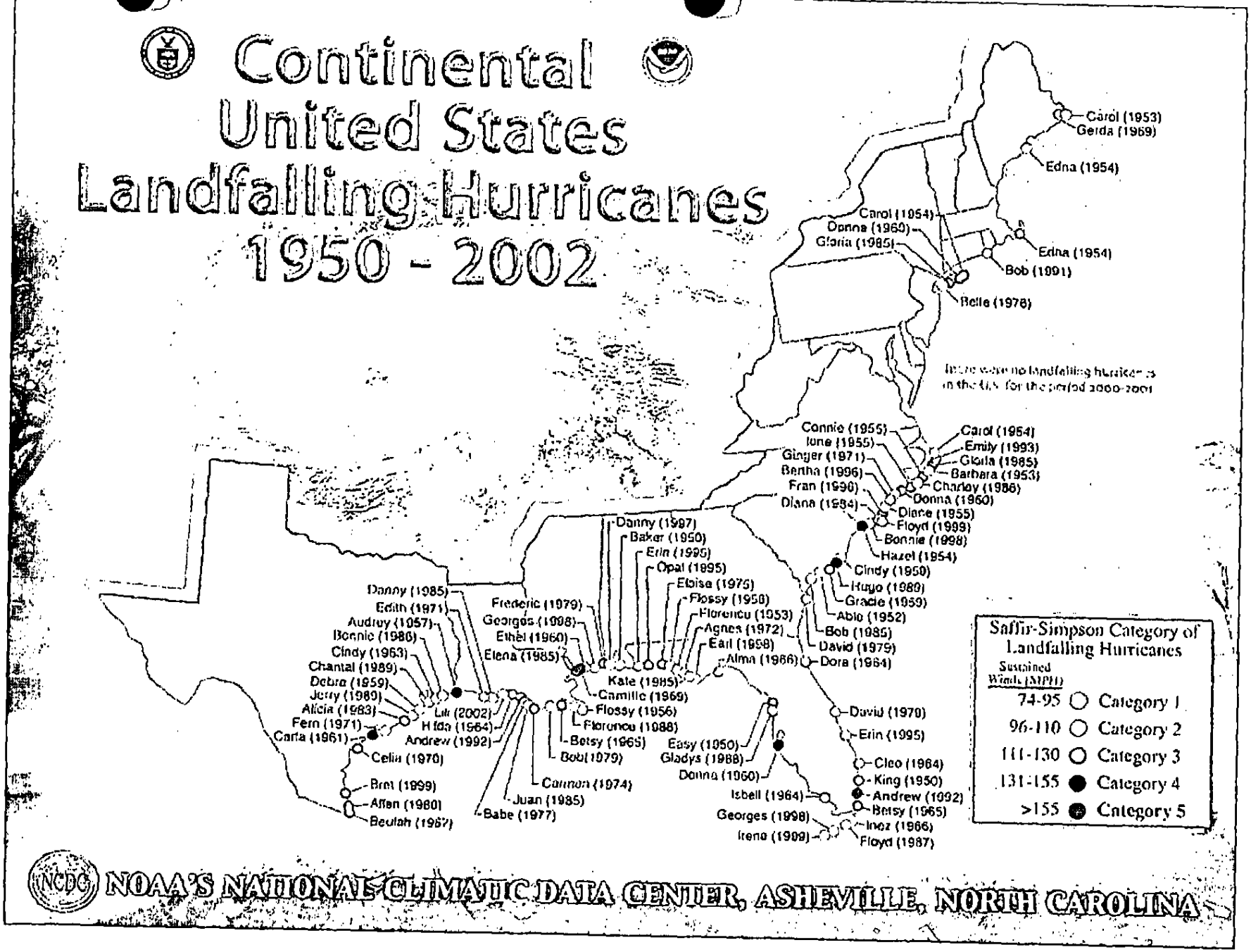

SITE
ZONE AE
(EL 94)
RM11
RM 12
PROTHRO ROAD
ROAD
Bayou
BUSH
McKINNEY
WATKIN
MORNING STAR
LIMIT O
DETAILE
STUDY
ZONE AE
24
19
20
25
30
93
71
158
M
J
E
D
C
94
† This area protected from the one percent annual chance (100 year) flood by levee, dike, or other structures subject to possible failure or overtopping during larger floods.

Miscellaneous Hurricane Information

BEST COPY

for the following Pages

2



http://www.ncdc.noaa.gov/img/climate/severeweather/hur5002.jpg

7/24/2003

Hurricanes and Tropical Storms in Louisiana
Tropical Cyclone Strikes By Decade

Decade	Hurricanes	Tropical Storms	Total
1850's	3	1	4
1860's	7	2	9
1870's	6	3	9
1880's	7	3	10
1890's	3	6	9
1900's	2	7	9
1910's	3	2	5
1920's	3	2	5
1930's	2	8	10
1940's	3	9	12
1950's	2	7	9
1960's	4	1	5
1970's	4	3	7
1980's	4	5	9
1990's	3	2	5
2000's	TBD	TBD	TBD
Totals	56	61	117

c:\LA Hurricanes

Highest Rainfall Amounts Associated with Past Hurricanes/Tropical Storms

Amount	Location	Dates of the Event
33.71"	Crowley	8/06-10/1940
31.66"	Abbeville	8/06-10/1940
29.65"	Lafayette	8/06-10/1940
22.30"	Logansport	7/22-26/1933
21.10"	Terrytown	9/10-14/1998
19.26"	Morgan City	9/15-19/1943
17.78"	Galliano	10/27-31/1985
17.71"	Jeanerette	10/2-4/1964
17.60"	Gueydan	8/08/1940
16.70"	Golden Meadow	9/24-26/1956

Ten Most Deadly Storms to Hit Louisiana

Fatalities	Dates
2,000	10/1-2/1893
526	6/27/1957
353	9/20/1909
275	9/29/1915
218+	8/10-12/1856
110	10/12/1886
81	10/3/1964
51	9/19-20/1947
47	8/11/1860
45	8/19-20/1812

BEST COPY

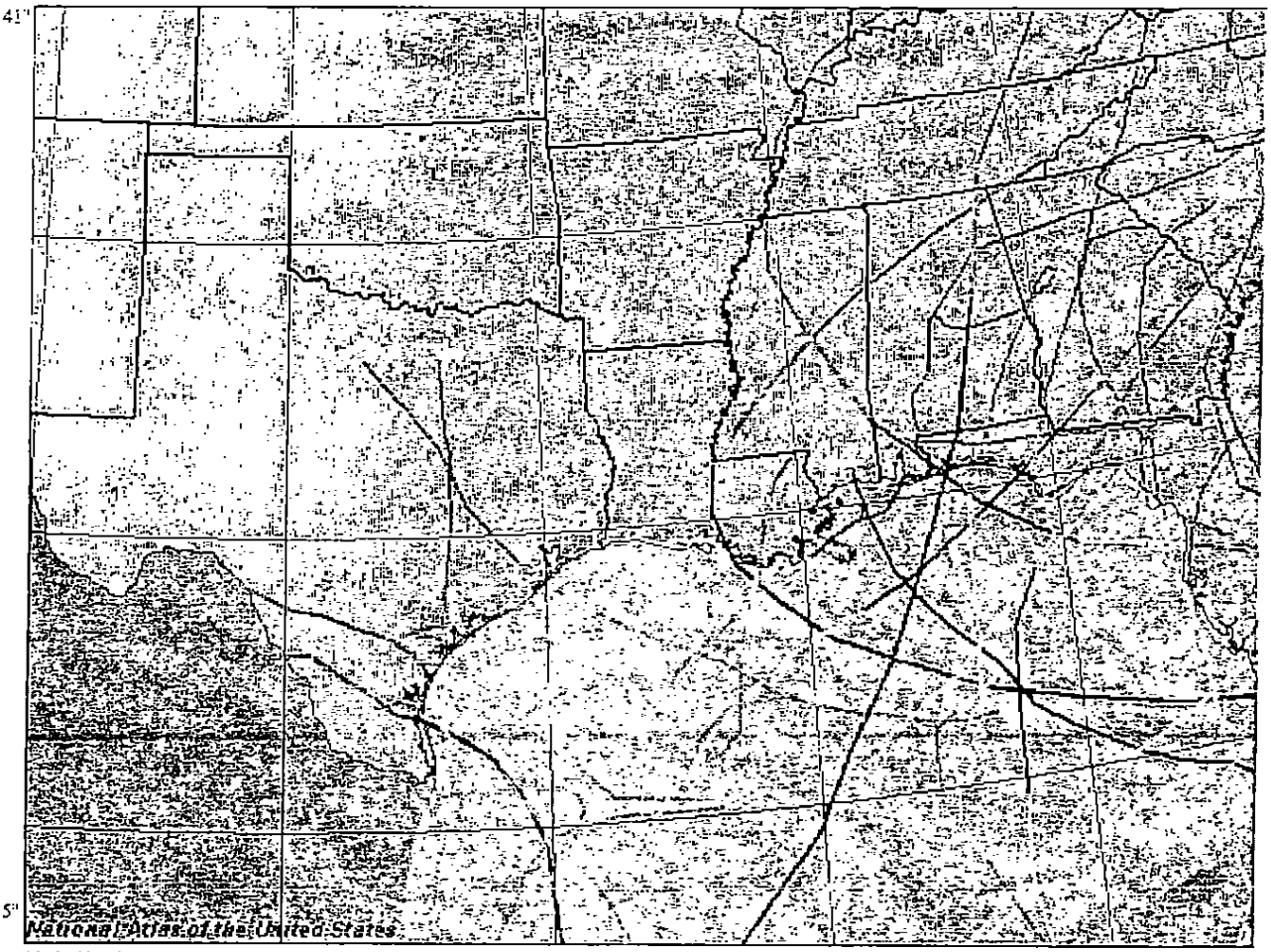
Highest Wind Gusts in Louisiana		
Highest Gust	**Location**	**Date**
175 mph	Bayou Teche	8/26/1992
160 mph	Lower Plaquemines	8/17/1969
160 mph	Grand Isle	9/9/1965
150 mph	Oil Rig Offshore SW LA	6/27/1957
135 mph	Franklin	10/3/1964
130 mph	New Canal Lighthouse	9/29/1915
125 mph	Sulphur	8/6/1918
125 mph	New Orleans	9/20/1947
125 mph	Slidell	8/18/1969
120 mph	Thibodaux and Napoleonville	8/26/1926
120 mph	Abbeville	9/8/1974

c:\LAWindGusts

Lowest Barometric Pressures Recorded in Louisiana

Pressure	Date	Location
27.90"	8/17/1969	Garden Island
28.00"	9/09/1965	Houma & Grand Isle
28.01"	9/29/1915	New Orleans Harbor
28.20"	8/11/1856	Isle Dernieres
28.31"	8/26/1926	Houma
28.36"	8/06/1918	Sulphur
28.40"	10/3/1964	Franklin
28.56"	8/18/1969	Slidell
28.57"	9/19/1947	New Orleans
28.65"	10/2/1893	Pascagoula, MS

Hurricanes and Tropical Storms: 1990's



MAP KEY

Boundaries

States

Source: U. S. Geological Survey

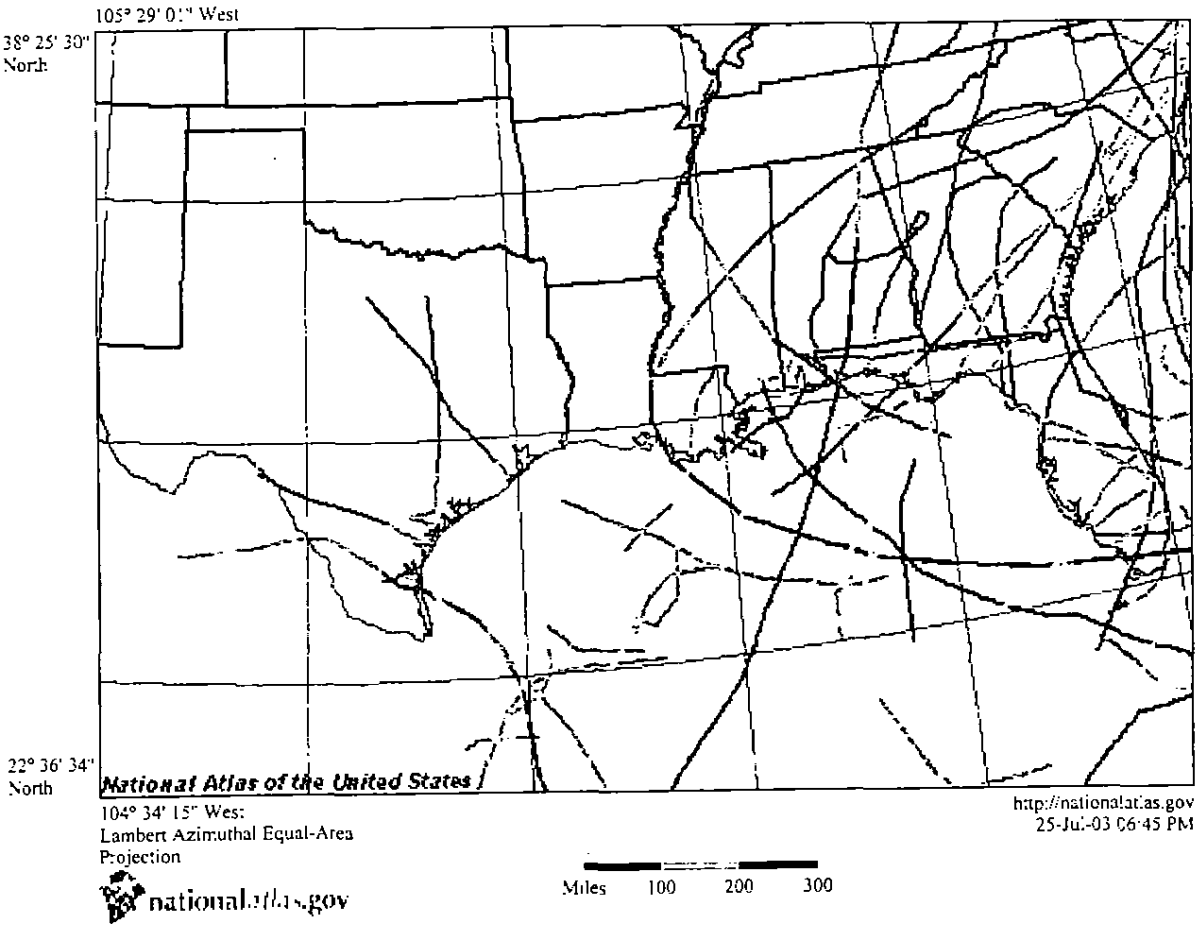
States

Climate

Major Landfalling U.S. Hurricanes

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Hurricanes and Tropical Storms: 1990's



MAP KEY

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Source: U. S. Geological Survey

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Climate

Major Landfalling U.S. Hurricanes

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Advisory wind speed measurement (in miles per hour)

74 - 200

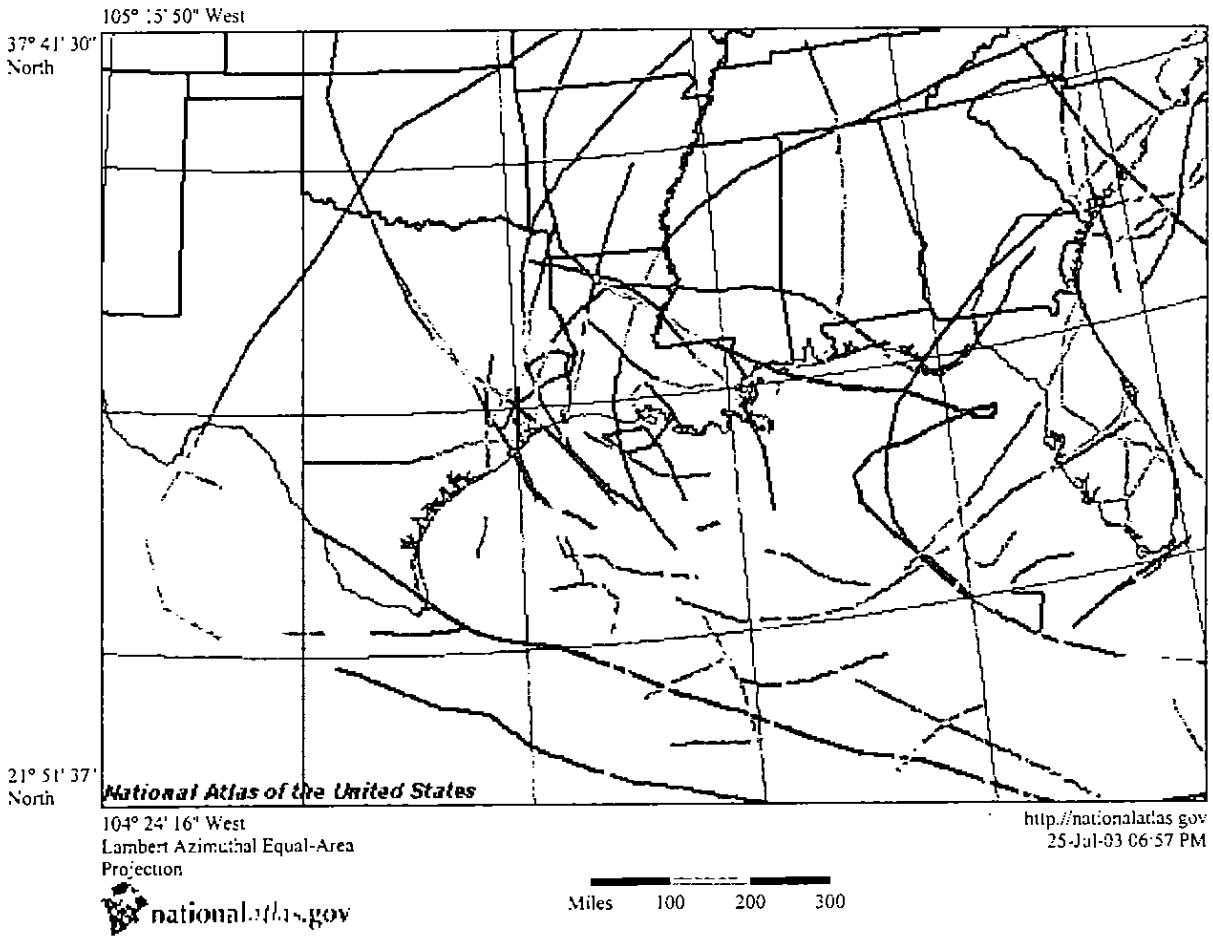
39 - 73

12 - 38

Tropical Cyclones

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Hurricanes and Tropical Storms: 1980's



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Major Landfalling U.S. Hurricanes

Source: NOAA National Hurricane Center/ Tropical Prediction Center

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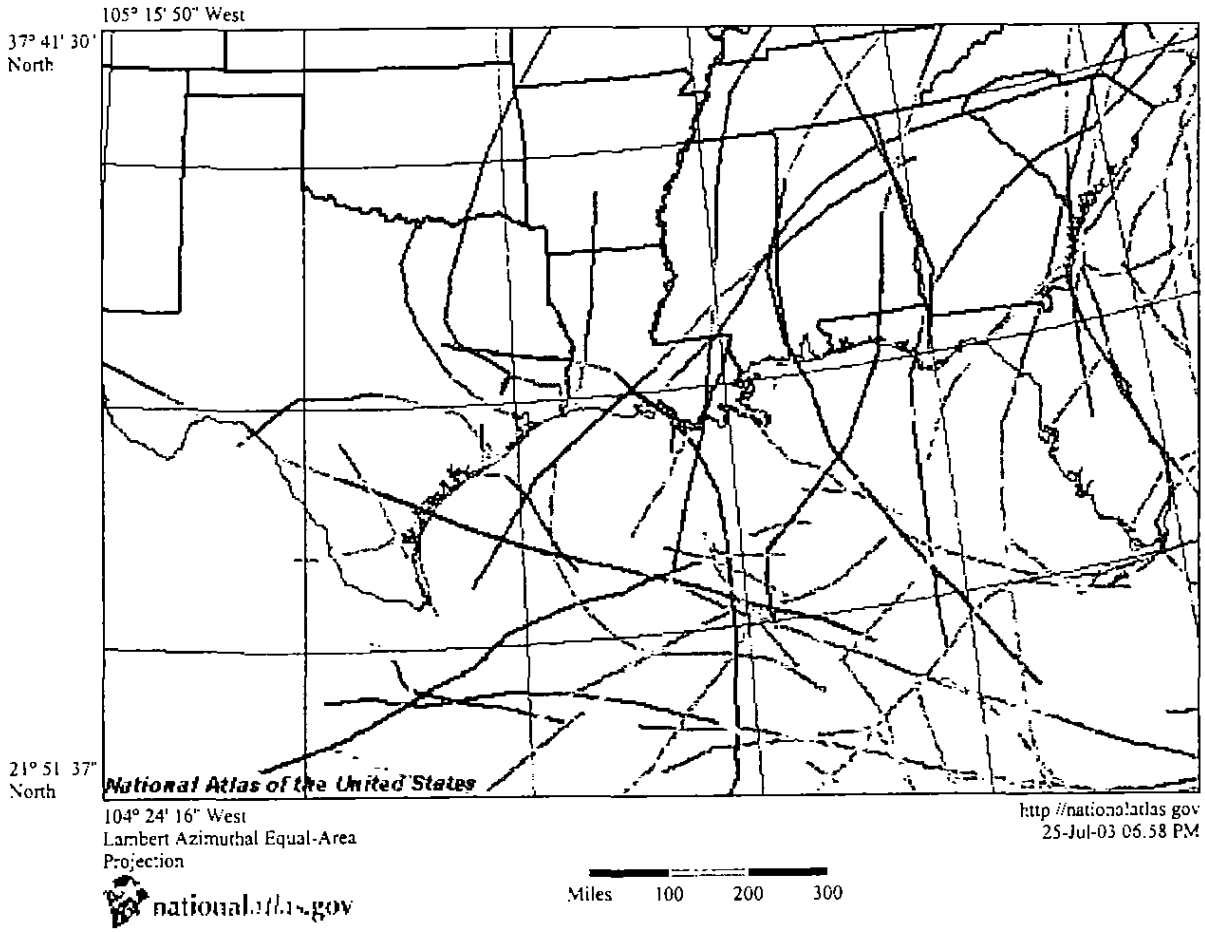
39 - 73

12 - 38

Tropical Cyclones

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Hurricanes and Tropical Storms: 1970's



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Climate

Major Landfalling U.S. Hurricanes

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Advisory wind speed measurement (in miles per hour)

74 - 200

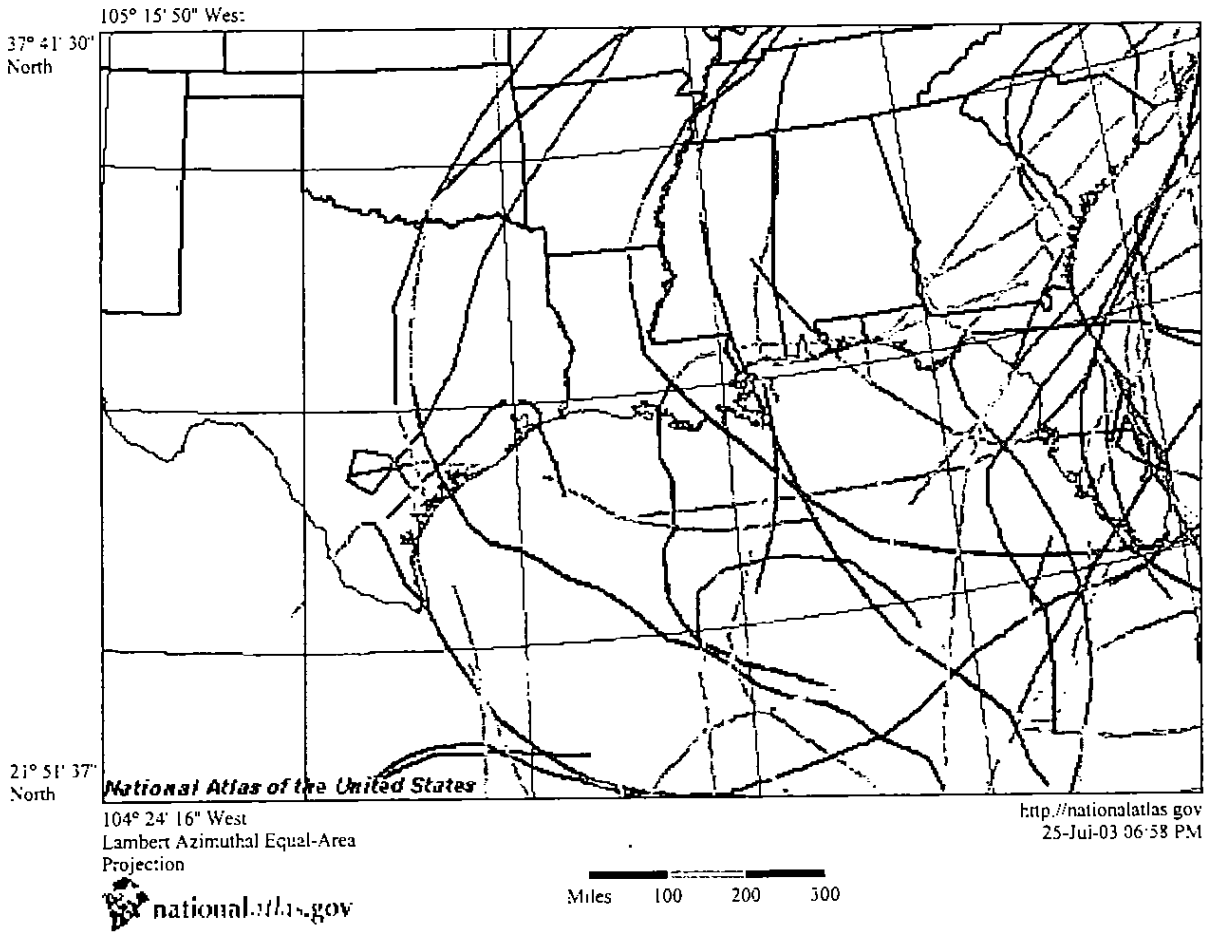
39 - 73

12 - 38

Tropical Cyclones

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Hurricanes and Tropical Storms: 1960's



MAP KEY

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Climate

Major Landfalling U.S. Hurricanes

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Advisory wind speed measurement (in miles per hour)

74 - 200

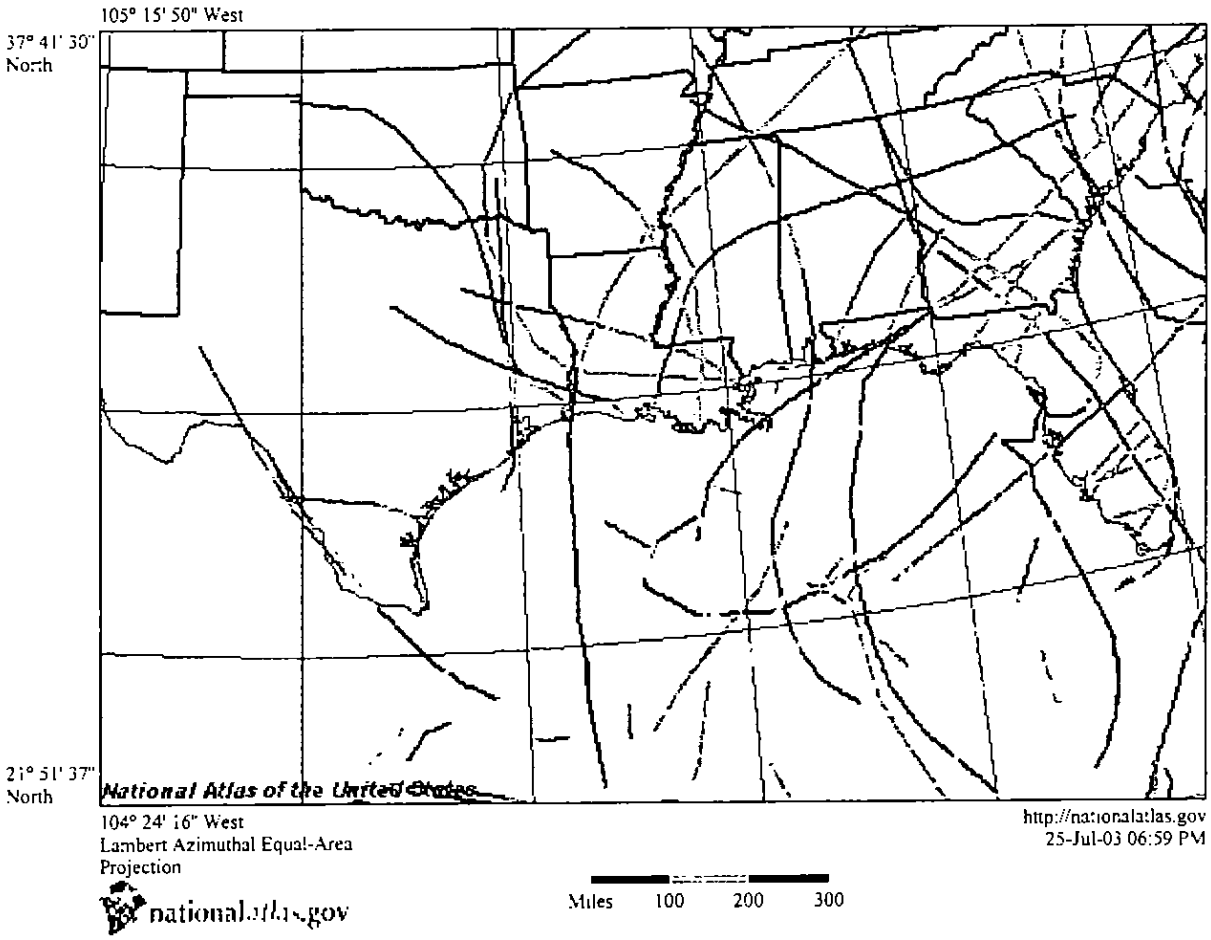
39 - 73

12 - 38

Tropical Cyclones

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Hurricanes and Tropical Storms: 1950's



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Climate

Major Landfalling U.S. Hurricanes

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Advisory wind speed measurement (in miles per hour)

74 - 200

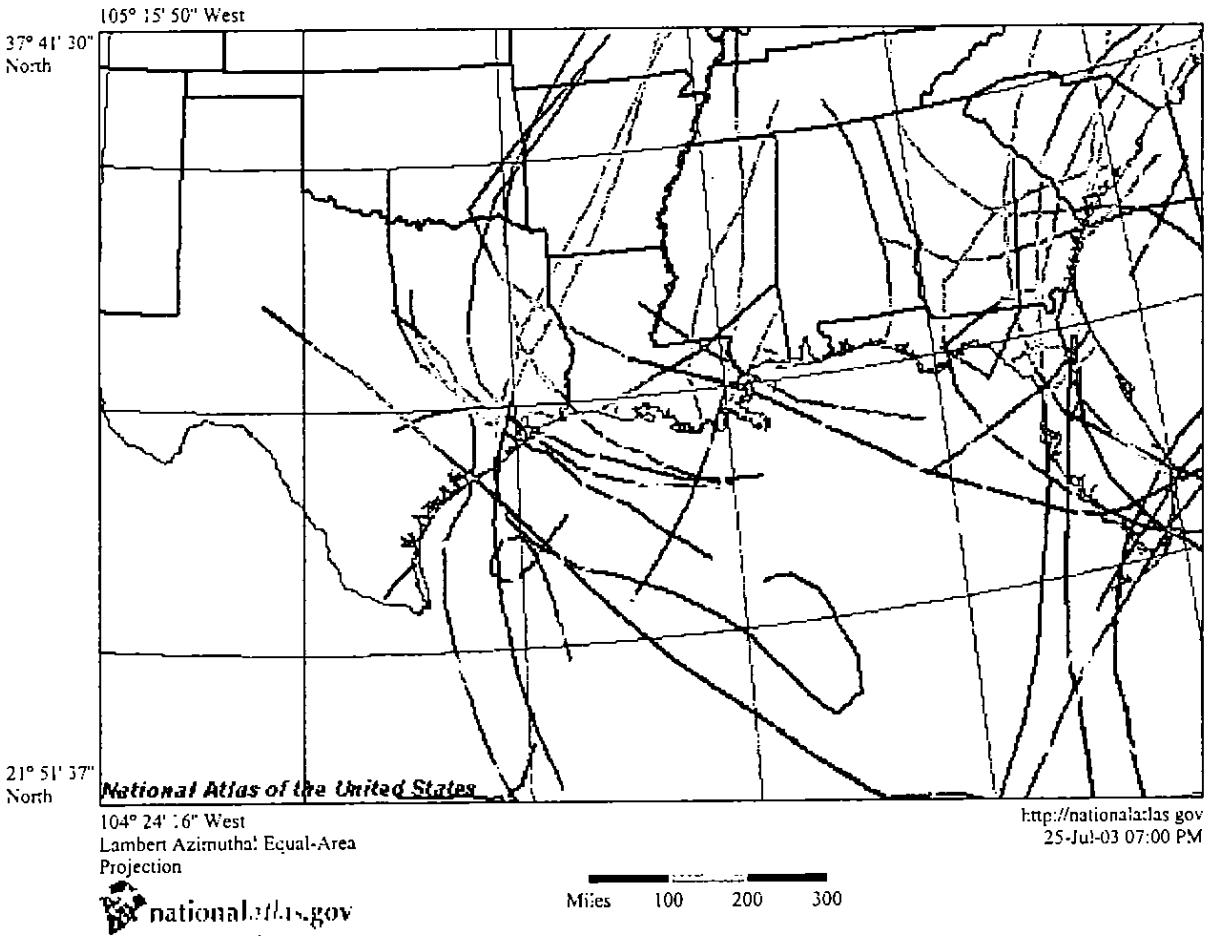
39 - 73

12 - 38

Tropical Cyclones

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Hurricanes and Tropical Storms: 1940's



MAP KEY

Boundaries

States

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States

Climate

Major Landfalling U.S. Hurricanes

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Advisory wind speed measurement (in miles per hour)

74 - 200

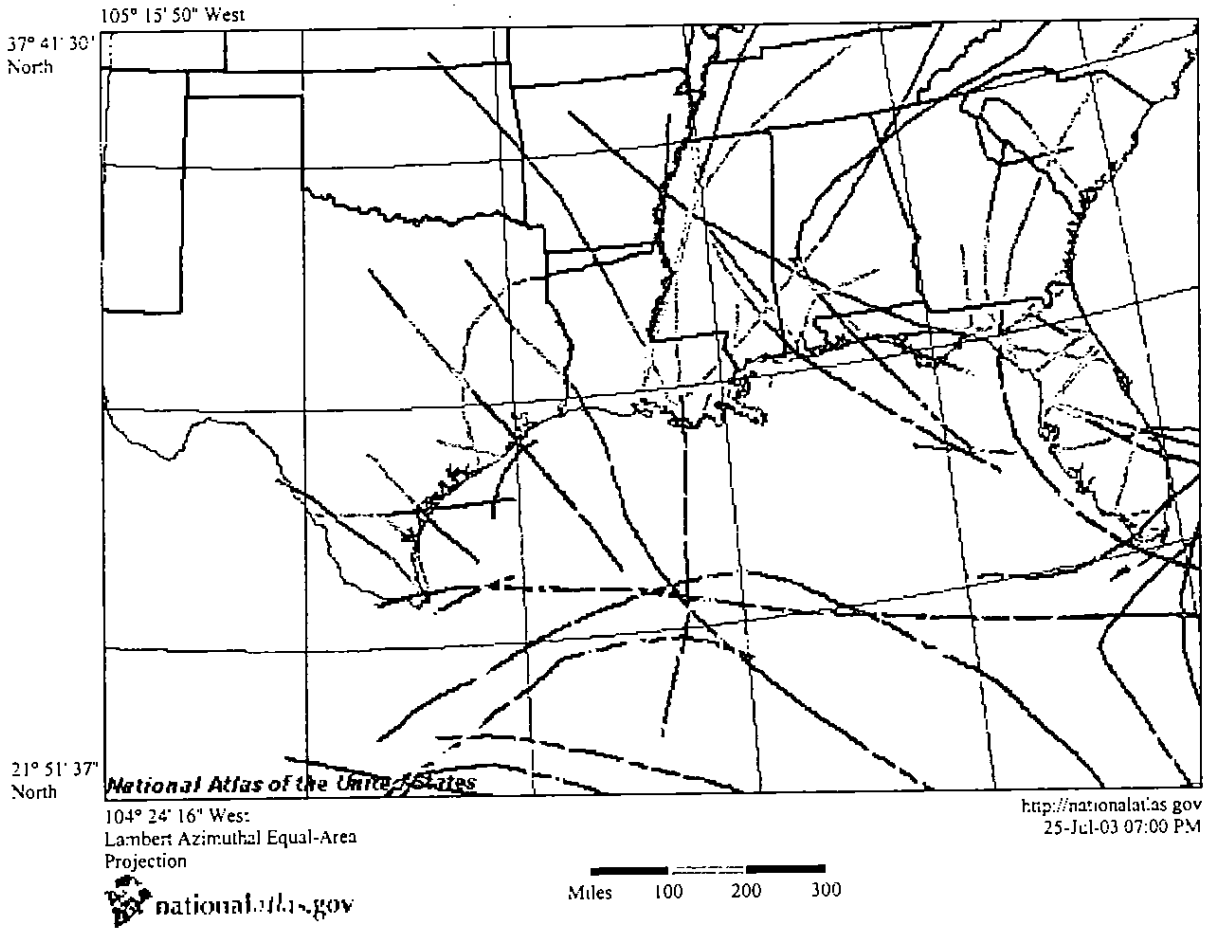
39 - 73

12 - 38

Tropical Cyclones

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Hurricanes and Tropical Storms: 1930's



MAP KEY

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States

Source: U. S. Geological Survey

States

Climate

Major Landfalling U.S. Hurricanes

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Advisory wind speed measurement (in miles per hour)

74 - 200

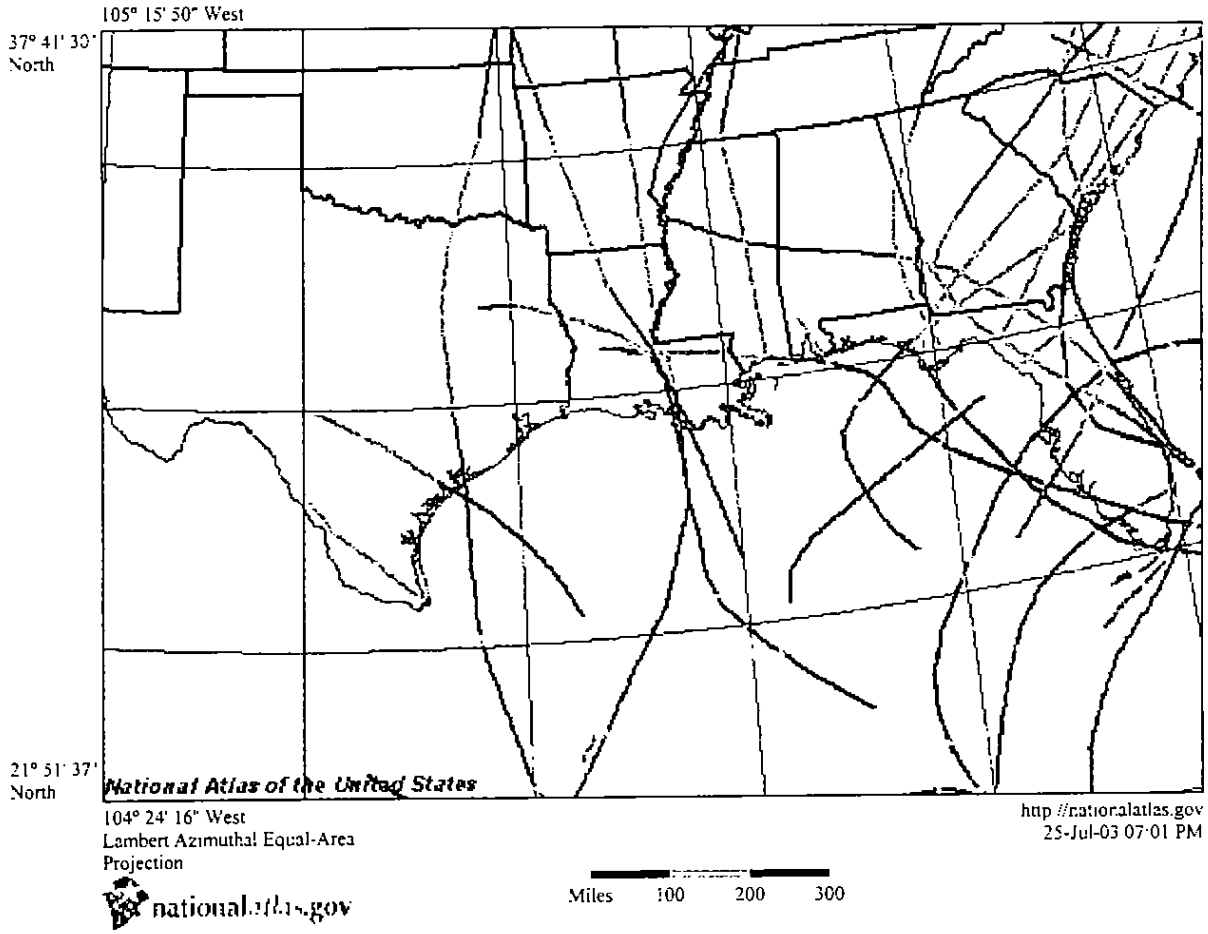
39 - 73

12 - 38

Tropical Cyclones

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Hurricanes and Tropical Storms: 1920's



MAP KEY

Boundaries

States

Source: U. S. Geological Survey

States

Climate

Major Landfalling U.S. Hurricanes

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Advisory wind speed measurement (in miles per hour)

74 - 200

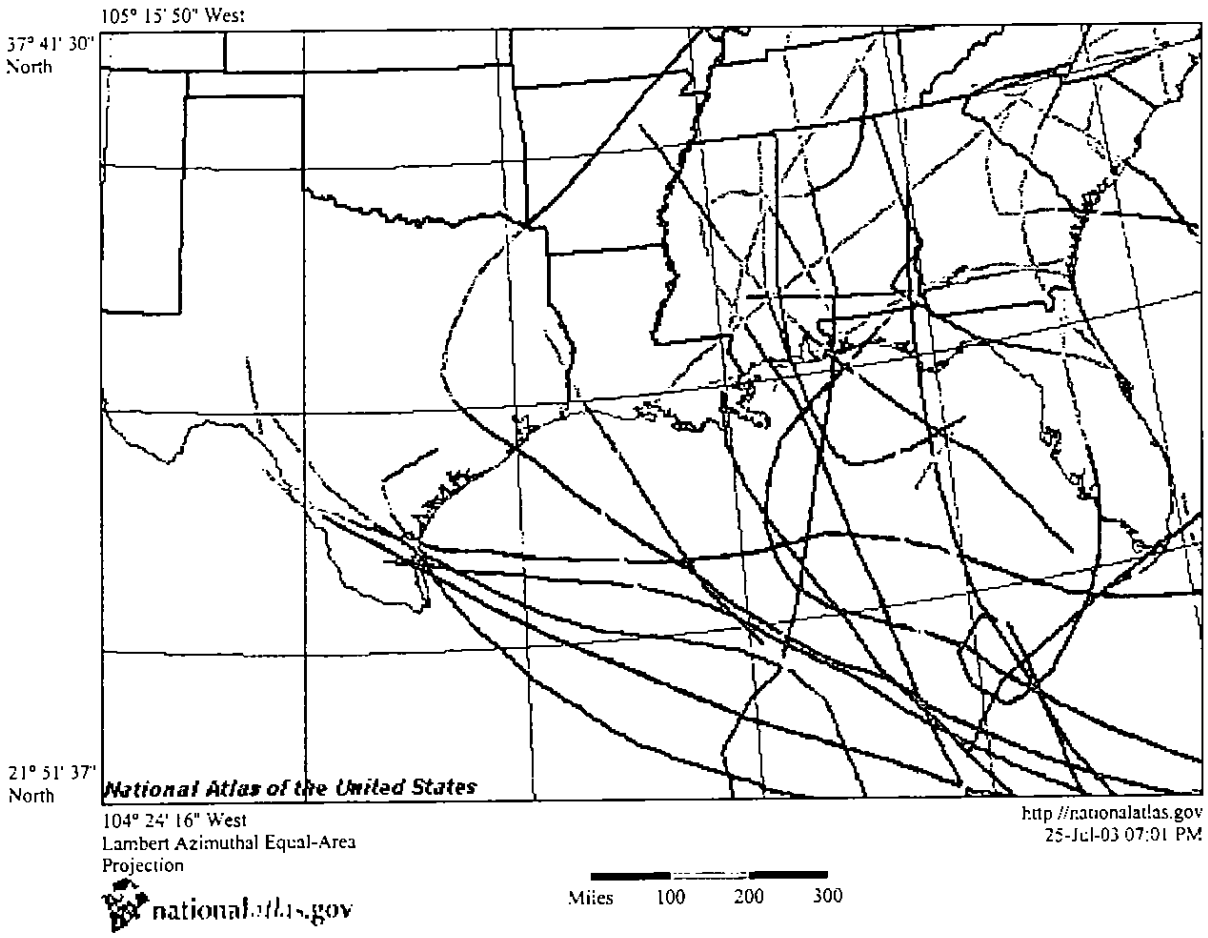
39 - 73

12 - 38

Tropical Cyclones

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Hurricanes and Tropical Storms: 1910's



MAP KEY

Boundaries

States
Source: U. S. Geological Survey

States

Climate

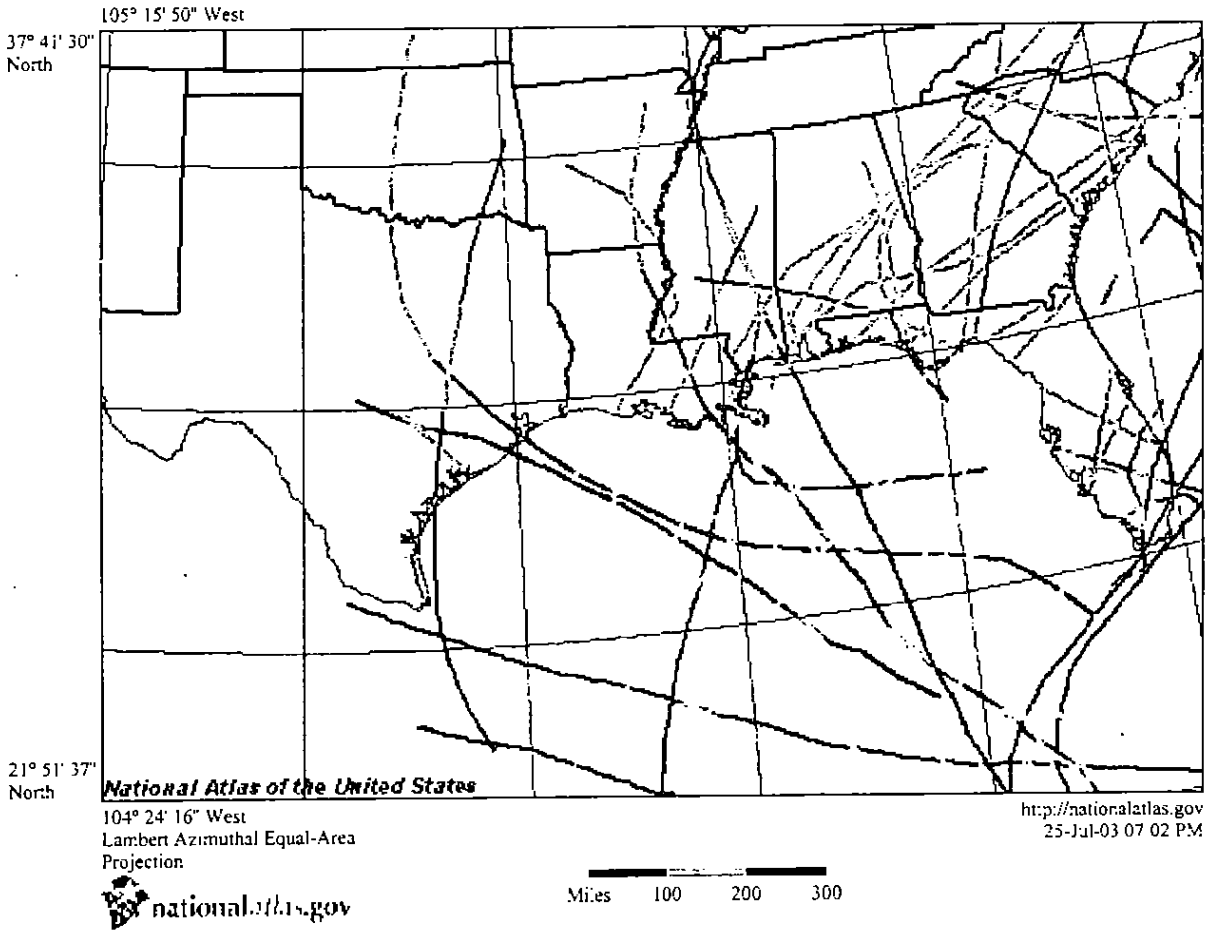
Major Landfalling U.S. Hurricanes
Source: NOAA National Hurricane Center/ Tropical Prediction Center

Advisory wind speed measurement (in miles per hour)

74 - 200
39 - 73
12 - 38

Tropical Cyclones
Source: NOAA National Hurricane Center/ Tropical Prediction Center

Hurricanes and Tropical Storms: 1900's



MAP KEY

Boundaries

States

Source: U. S. Geological Survey

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Climate

Major Landfalling U.S. Hurricanes

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Advisory wind speed measurement (in miles per hour)

74 - 200

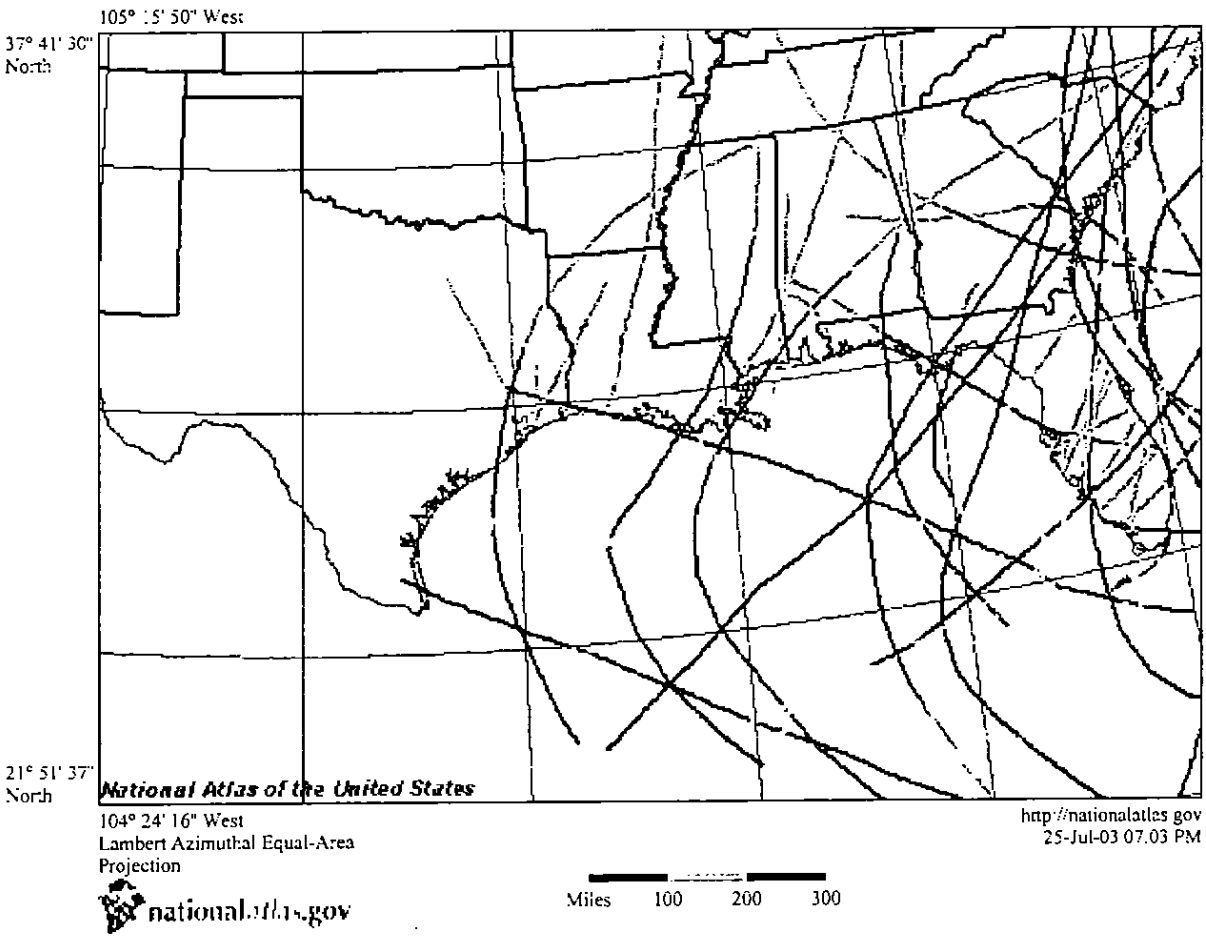
39 - 73

12 - 38

Tropical Cyclones

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Hurricanes and Tropical Storms: 1890's



MAP KEY

Boundaries

States

Source: U. S. Geological Survey

States

Climate

Major Landfalling U.S. Hurricanes

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Advisory wind speed measurement (in miles per hour)

74 - 200

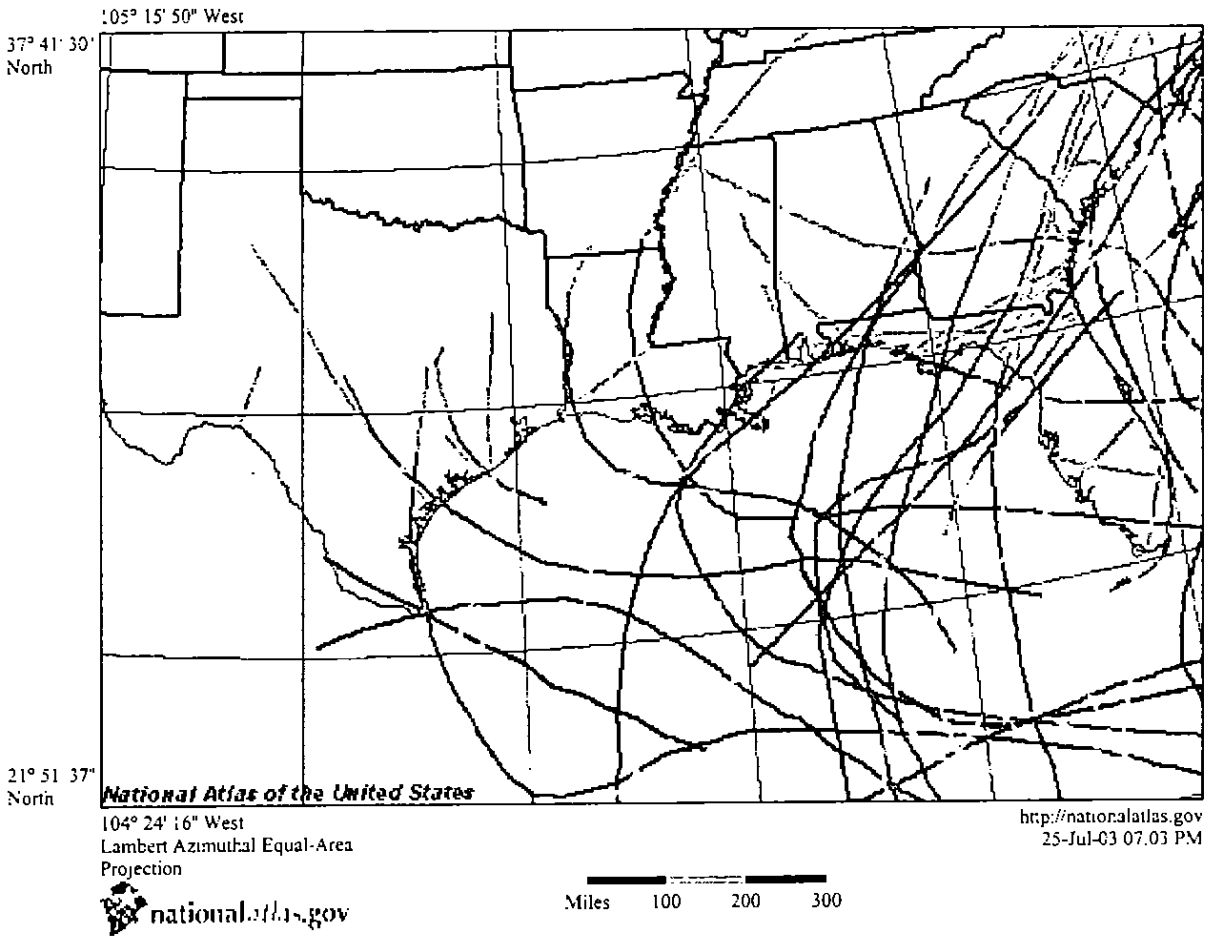
39 - 73

12 - 38

Tropical Cyclones

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Hurricanes and Tropical Storms: 1880's



MAP KEY

Boundaries

States

Source: U. S. Geological Survey

States

Climate

Major Landfalling U.S. Hurricanes

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Advisory wind speed measurement (in miles per hour)

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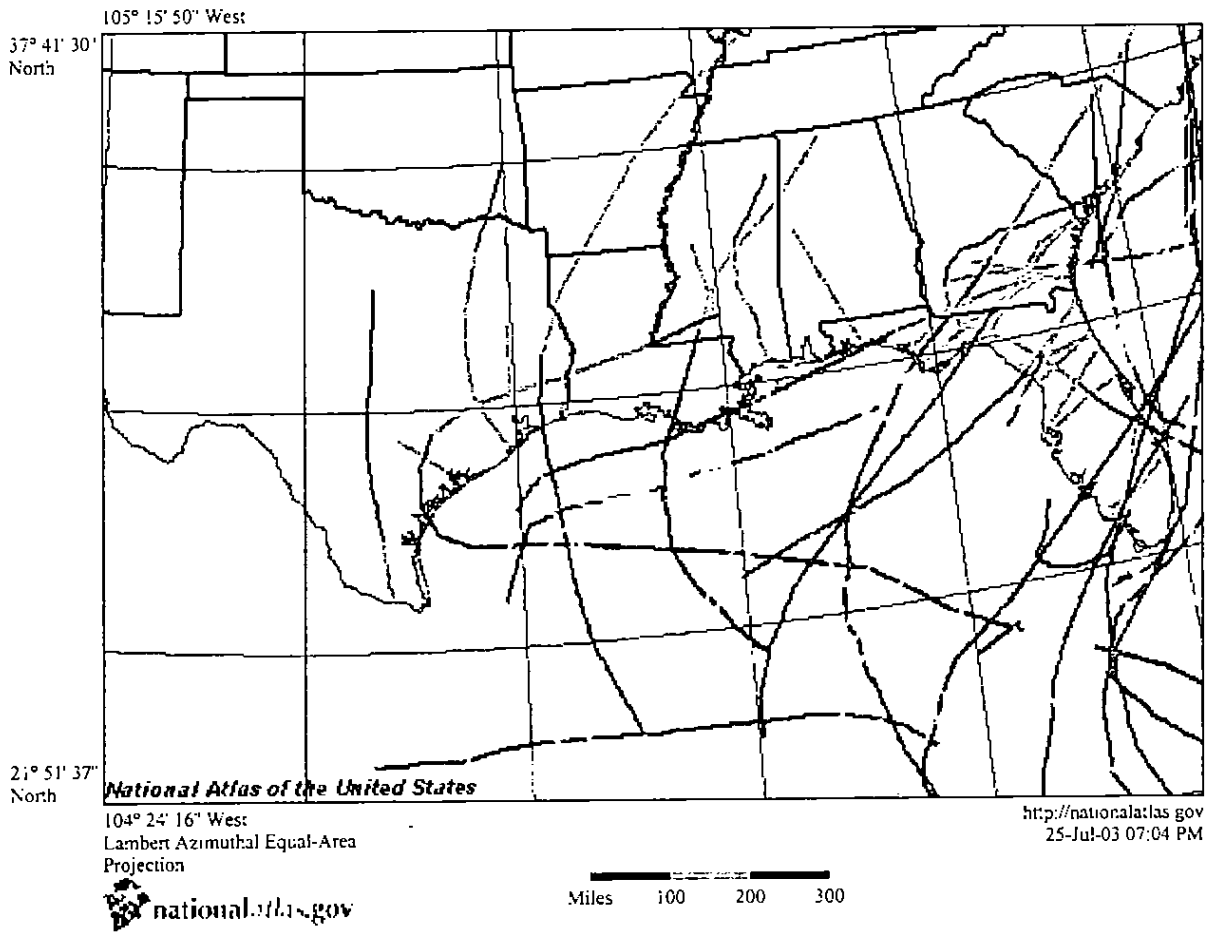
39 - 73

12 - 38

Tropical Cyclones

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Hurricanes and Tropical Storms: 1870's



MAP KEY

Boundaries

States

Source: U. S. Geological Survey

States

Climate

Major Landfalling U.S. Hurricanes

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Advisory wind speed measurement (in miles per hour)

74 - 200

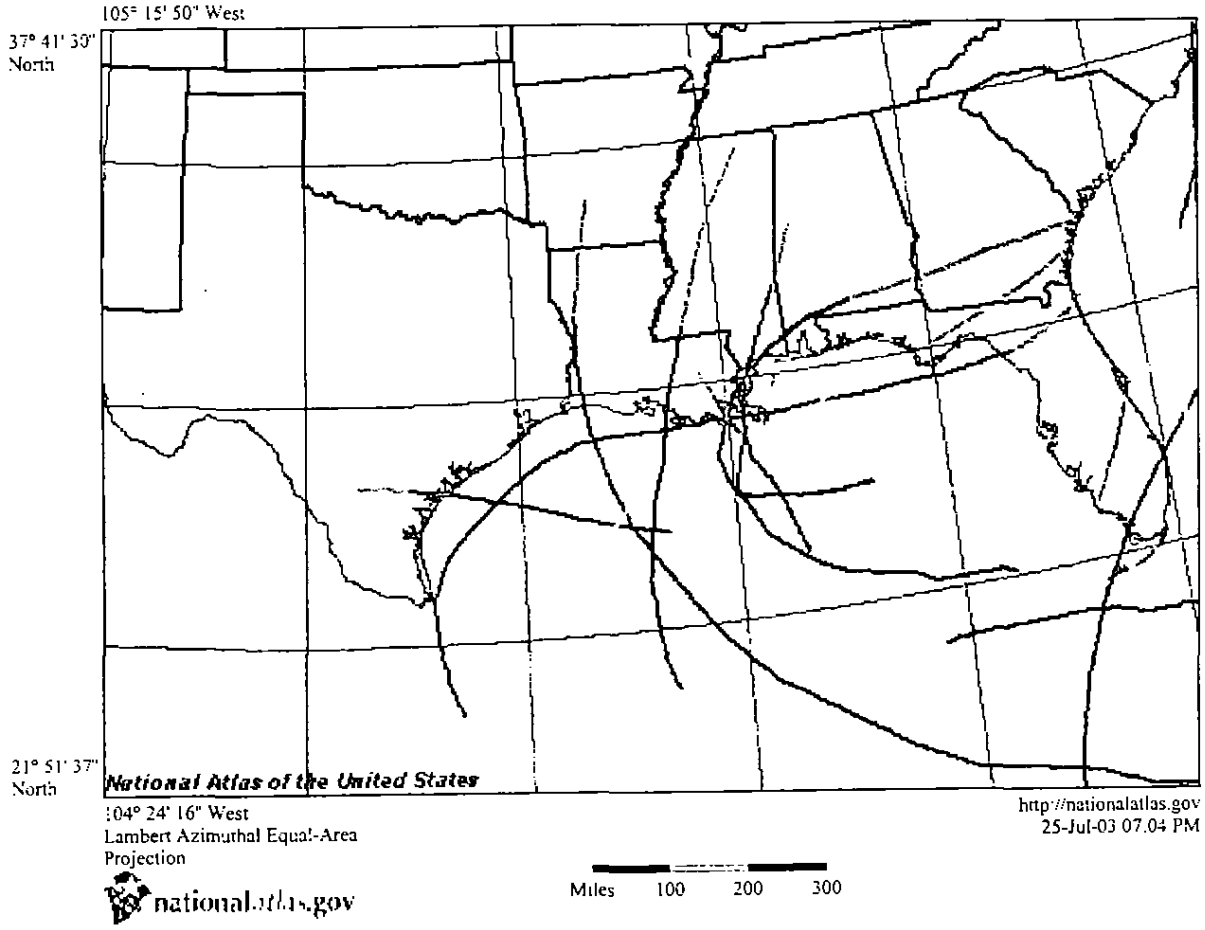
39 - 73

12 - 38

Tropical Cyclones

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Hurricanes and Tropical Storms: 1860's



MAP KEY

Boundaries

States
Source: U. S. Geological Survey

States

Climate

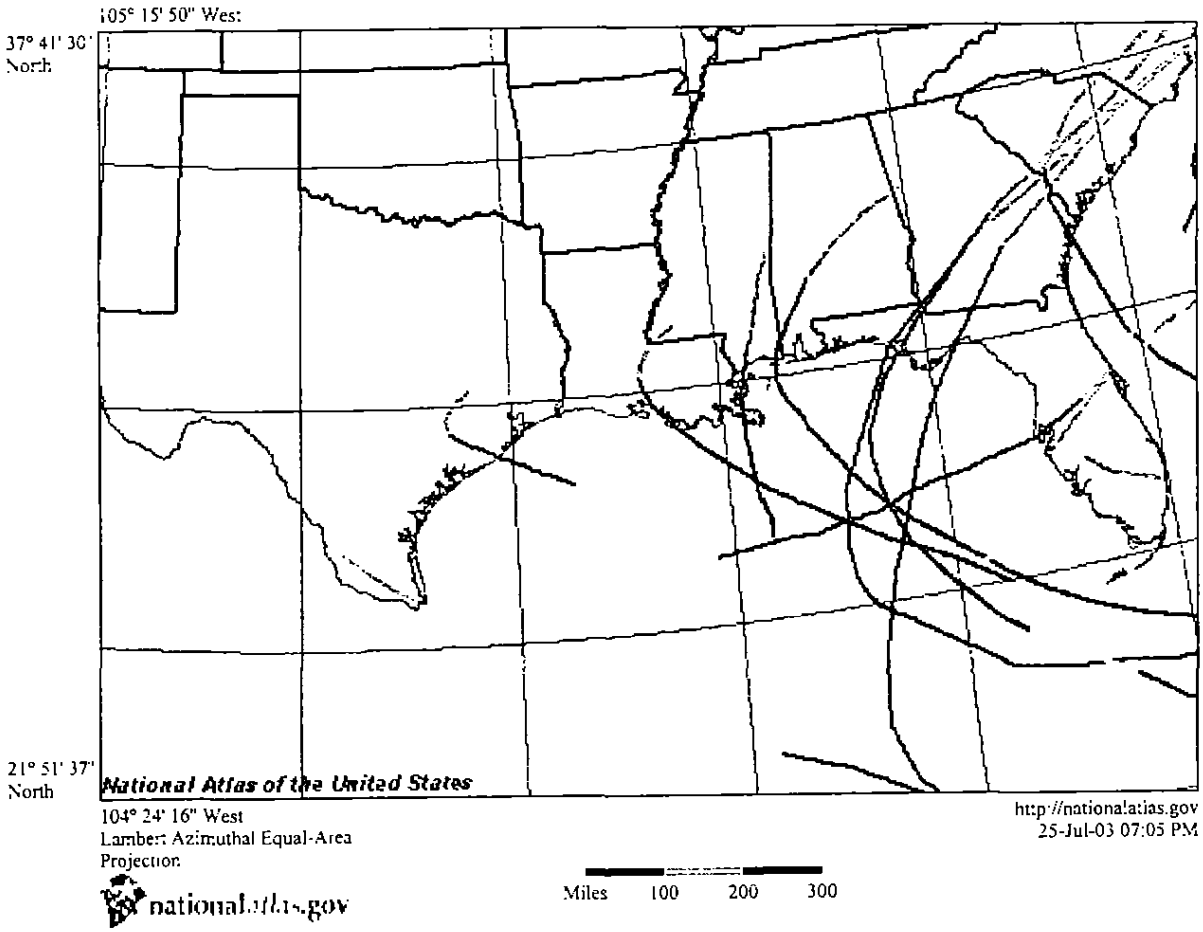
Major Landfalling U.S. Hurricanes
Source: NOAA National Hurricane Center/ Tropical Prediction Center

Advisory wind speed measurement (in miles per hour)

74 - 200
39 - 73
12 - 38

Tropical Cyclones
Source: NOAA National Hurricane Center/ Tropical Prediction Center

Hurricanes and Tropical Storms: 1850's



MAP KEY

Boundaries

States

Source: U. S. Geological Survey

States

Climate

Major Landfalling U.S. Hurricanes

Source: NOAA National Hurricane Center/ Tropical Prediction Center

Advisory wind speed measurement (in miles per hour)

74 - 200

39 - 73

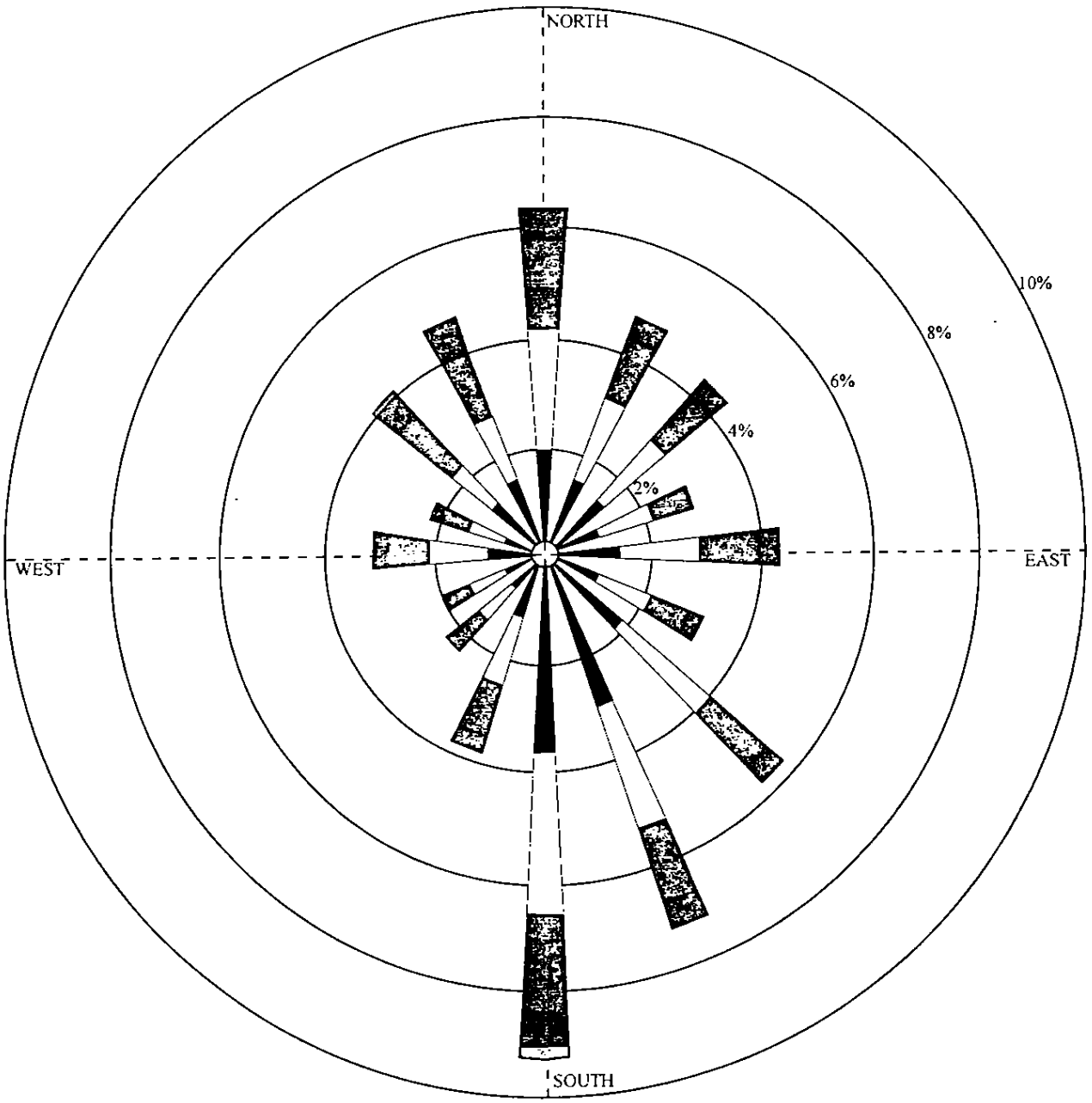
12 - 38

Tropical Cyclones

Source: NOAA National Hurricane Center/ Tropical Prediction Center

WIND ROSE PLOT

OBSERVATIONS IN - ENGLAND AFB/ALEXANDRIA INTERNATIONAL AIRPARK, LA



Wind Speed (Knots) › 21 17 - 21 11 - 16 7 - 10 4 - 6 1 - 3	MODELER **EcoScience Staff**	DATE **07/21/03**	COMPANY NAME **EcoScience Resource Group**
	DISPLAY **Wind Speed**	UNIT **Knots**	COMMENTS **Source:** • **Global Climatology Branch** • **US AFETAC** • **Air Weather Service**
	AVG. WIND SPEED **3.64 Knots**	CALM WINDS **29.7%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1980-1994**	PROJECT/PLOT NO. **Clean Harbors Colfax, LA Appendix 9**

APPENDIX P

AGENCY LETTERS

EcoScience Resource Group, L.L.C.

Evolving to meet tomorrow's challenges

July 7, 2003

Ms. Karen Swallow
U.S. Fish and Wildlife Service
646 Cajundome Blvd.
Lafayette, LA 70506

Dear Ms. Swallow:

Clean Harbors Colfax, LLC, is operating a permitted hazardous waste disposal facility at Colfax in Grant Parish as shown on the attached vicinity map. Clean Harbors Colfax, LLC is located at 3763 Highway 471, Colfax, LA at latitude 31° 34' 05" North and longitude 92° 43' 21" West. No expansion beyond the immediate area of the existing facility is anticipated. Clean Harbors Colfax, LLC, is renewing their current Louisiana Hazardous Waste Permit after more than a quarter of a century of safe operations.

EcoScience Resource Group, LLC, on behalf of Clean Harbors Colfax, LLC, requests that the Department of Wildlife and Fisheries confirm by letter that the continued hazardous waste disposal at Colfax will not impact any endangered or threatened species or their habitats within 1000 feet of the site. Your reply letter will be attached to their Louisiana Hazardous Waste Part II Permit Renewal Application which is due August 15, 2003.

I sincerely appreciate your assistance. Please call if you have any questions or require any further information.

Respectfully,
EcoScience Resource Group, LLC

J. A. Simmerman
Project Manager

12010 Lakeland Park Blvd. Suites 113, 117, 121 Baton Rouge, Louisiana 70809 Telephone: 225/755-8844 Fax: 225/755-8845
www.esrgroup.com

EcoScience Resource Group, L.L.C.

Evolving to meet tomorrow's challenges

July 7, 2003

Ms. Laurel Wyckoff
State of Louisiana
Division of Archaeology
P.O. Box 44247
Baton Rouge, LA 70804

Re: Historic/Archeological Properties Evaluation

Dear Ms. Wyckoff:

Clean Harbors Colfax, LLC, is operating a permitted hazardous waste disposal facility at Colfax in Grant Parish as shown on the attached vicinity map. Clean Harbors Colfax, LLC is located at 3763 Highway 471, Colfax, LA at latitude 31° 34' 05" North and longitude 92° 43' 21" West. No expansion beyond the immediate area of the existing facility is anticipated. Clean Harbors Colfax, LLC, is renewing their current Louisiana Hazardous Waste Permit after more than a quarter of a century of safe operations.

EcoScience Resource Group, LLC, on behalf of Clean Harbors Colfax, LLC, requests that the State of Louisiana Department of Culture, Recreation, and Tourism confirm by letter that the continued hazardous waste disposal at Colfax will not affect or impact any recognized historic or archeologically significant areas within 1000 feet of the site. Your reply letter will be attached to their Louisiana Hazardous Waste Part II Permit Renewal Application which is due August 15, 2003.

I sincerely appreciate your assistance. Please call if you have any questions or require any further information.

Respectfully,
EcoScience Resource Group, LLC

J. A. Simmerman
Project Manager

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www.esrgroup.com

EcoScience Resource Group, L.L.C.

Evolving to meet tomorrow's challenges

July 7, 2003

Ms. Laurel Wyckoff
State of Louisiana
Department of Culture, Recreation, and Tourism
P.O. Box 44247
Baton Rouge, LA 70804

Re: Recreational Area Evaluation

Dear Ms. Wyckoff:

Clean Harbors Colfax, LLC, is operating a permitted hazardous waste disposal facility at Colfax in Grant Parish as shown on the attached vicinity map. Clean Harbors Colfax, LLC is located at 3763 Highway 471, Colfax, LA at latitude 31° 34' 05" North and longitude 92° 43' 21" West. No expansion beyond the immediate area of the existing facility is anticipated. Clean Harbors Colfax, LLC, is renewing their current Louisiana Hazardous Waste Permit after more than a quarter of a century of safe operations.

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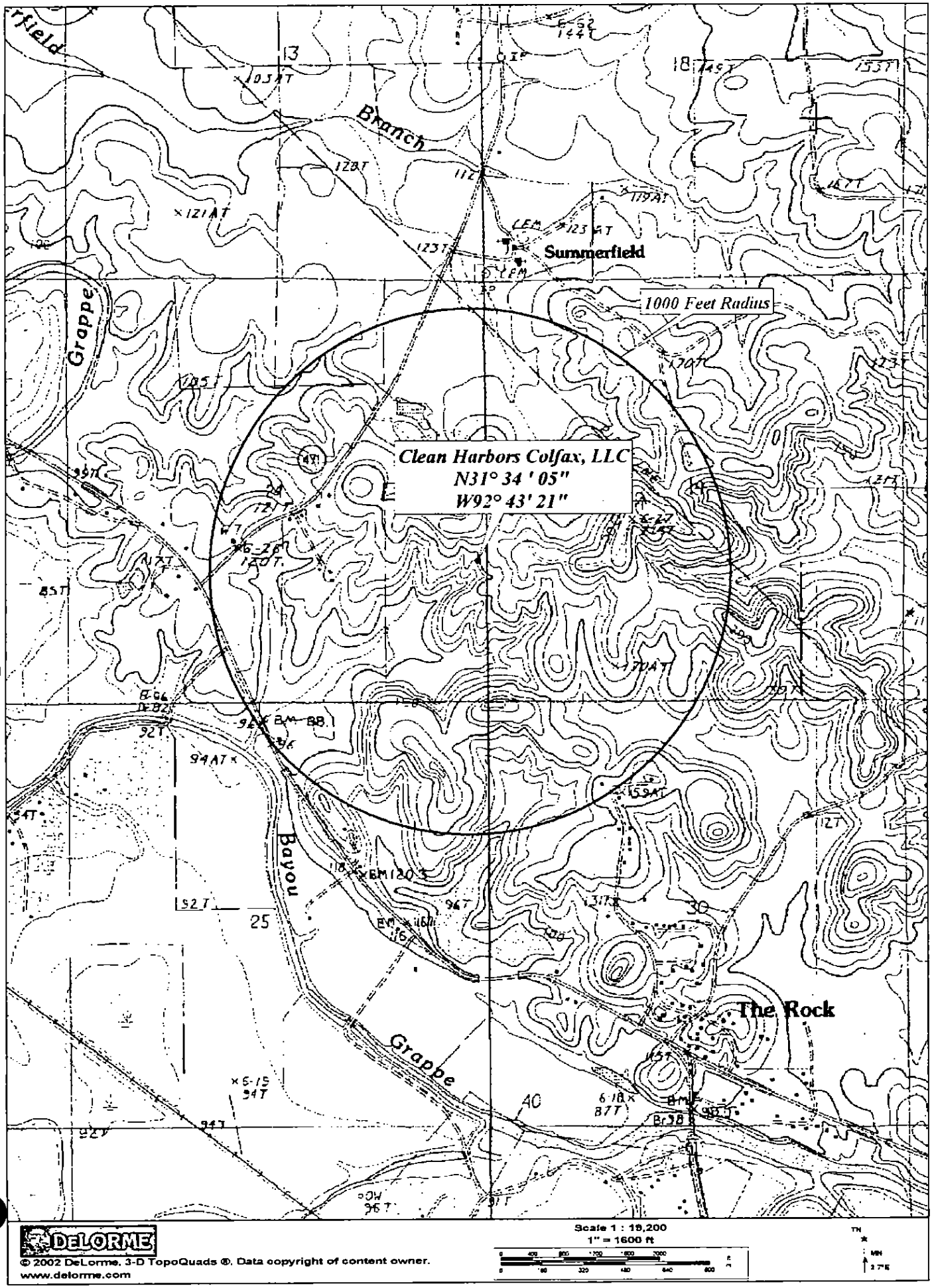
I sincerely appreciate your assistance. Please call if you have any questions or require any further information.

Respectfully,
EcoScience Resource Group, LLC

J. A. Simmerman
Project Manager

120 Lakeland Park Blvd. Suites 13, 17, 121 Baton Rouge, Louisiana 70809 Telephone: 225/755-8844 Fax: 225/755-8845
www.esrgroup.com


Branch
Summerfield
1000 Feet Radius
Clean Harbors Colfax, LLC
N31° 34 ' 05"
W92° 43' 21"
Grappe
Bayou
The Rock
25
30
Scale 1 : 19,200
1" = 1600 ft
© 2002 DeLorme. 3-D TopoQuads ®. Data copyright of content owner.
www.delorme.com

July 7, 2003

Date: 7-22-03
No known archaeological sites or historic properties will be affected by this undertaking. This effect determination could change should new information come to our attention.
Laurel Wyckoff
State Historic Preservation Officer

Ms. Laurel Wyckoff
State of Louisiana
Division of Archaeology
P.O. Box 44247
Baton Rouge, LA 70804

Re: Historic/Archeological Properties Evaluation

Dear Ms. Wyckoff:

Clean Harbors Colfax, LLC, is operating a permitted hazardous waste disposal facility at Colfax in Grant Parish as shown on the attached vicinity map. Clean Harbors Colfax, LLC is located at 3763 Highway 471, Colfax, LA at latitude 31° 34' 05" North and longitude 92° 43' 21" West. No expansion beyond the immediate area of the existing facility is anticipated. Clean Harbors Colfax, LLC, is renewing their current Louisiana Hazardous Waste Permit after more than a quarter of a century of safe operations.

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I sincerely appreciate your assistance. Please call if you have any questions or require any further information.

Respectfully,
EcoScience Resource Group, LLC

J. A. Simmerman
Project Manager

4-7-03-1666

EcoScience Resource Group, L.L.C.

Evolving to meet tomorrow's challenges

July 7, 2003

Ms. Karen Swallow
U.S. Fish and Wildlife Service
646 Cajundome Blvd.
Lafayette, LA 70506

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I sincerely appreciate your assistance. Please call if you have any questions or require any further information.

Respectfully,
EcoScience Resource Group, LLC

J. A. Simmerman
Project Manager

THE PROPOSED ACTIVITIES WOULD NOT SIGNIFICANTLY AFFECT LISTED OR PROPOSED THREATENED OR ENDANGERED SPECIES

ENDANGERED SPECIES COORDINATOR
U.S. FISH & WILDLIFE SERVICE
LAFAYETTE, LOUISIANA
DATE: July 16, 2003

12010 Lakeland Park Blvd. Suites 113, 117, 121 Baton Rouge, Louisiana 70809 Telephone: 225/755-8844 Fax: 225/755-8845
www.esrgroup.com

APPENDIX Q

CERTIFICATE OF GOOD STANDING

UNITED STATES OF AMERICA

State of Louisiana

Fox McKeithen

SECRETARY OF STATE

As Secretary of State, of the State of Louisiana, I do hereby Certify that

CLEAN HARBORS COLFAX, LLC

A DELAWARE limited liability company domiciled at DOVER,

Filed charter and qualified to do business in this State on July 11, 2002,

I further certify that the records of this Office indicate the company has paid all fees due the Secretary of State, and so far as the Office of the Secretary of State is concerned, is in good standing and is authorized to do business in this State.

I further certify that this certificate is not intended to reflect the financial condition of this company since this information is not available from the records of this Office.

In testimony whereof, I have hereunto set my hand and caused the Seal of my Office to be affixed at the City of Baton Rouge on,

June 13, 2003

Fox McKeithen

ABA 35303384Q

Secretary of State

STATE OF LOUISIANA
UNION JUSTICE CONFIDENCE
SECRETARY OF STATE

CEPT.FICATE SS 102 S (R 3-66)

APPENDIX R

MISCELLANEOUS DATA AND FORMS

SAMPLE LOUISIANA HAZARDOUS WASTE MANIFEST

STATE OF LOUISIANA
DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL ASSISTANCE DIVISION
P.O. BOX 82135
BATON ROUGE, LOUISIANA 70884-2135

PLEASE PRINT OR TYPE (Form designed for use on elite (12-pitch) typewriter)

Form Aproved. OMB No. 2050-0039. Expires 9-30-99

UNIFORM HAZARDOUS WASTE MANIFEST

1 Generator's US EPA ID No. | Manifest Document No

2. Page of | Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address

4 Generator's Phone ( )

A. State Manifest Document Number: LA-A 6751487

B. State Generator's ID

5. Transporter 1 Company Name | 6. US EPA ID Number

C. State Transporter's ID

D. Transporter's Phone

7. Transporter 2 Company Name | 8 US EPA ID Number

E. State Tranporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address | 10. US EPA ID Number

G. State Facility's ID

H. Facility's Phone

11 US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14 Unit Wt/Vol	I. Waste No
a.					
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator I certify that I have a program in place to reduce the volume and toxicity waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, If I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name | Signature | Month Day Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Month Day Year

FACI

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name | Signature | Month Day Year

GENERATOR

IF SPILLED IN LOUISIANA CALL THE LOUISIANA HAZMAT UNIT AT 225/925-6595 (DAY OR NIGHT)

COPY 1

EPA Form 8700-22 k(Rev. 9/88) Previous edition is obsolete.

COPY 1: RETURN TO GENERATOR

SIGNATURE AND INFORMATION MUST BE LEGIBLE ALL COPIES

DEQ FORM HW-3 (R 9/02)

6751487

ATF STORAGE REQUIREMENTS

Subpart K—Storage

§ 55.201 General.

(a) Section 842(j) of the Act and § 55.29 of this part require that the storage of explosive materials by any person must be in accordance with the regulations in this part. Further, section 846 of this Act authorizes regulations to prevent the recurrence of accidental explosions in which explosive materials were involved. The storage standards prescribed by this subpart confer no right or privileges to store explosive materials in a manner contrary to State or local law.

(b) The Director may authorize alternate construction for explosives storage magazines when it is shown that the alternate magazine construction is substantially equivalent to the standards of safety and security contained in this subpart. Any alternate explosive magazine construction approved by the Director prior to August 9, 1982, will continue as approved unless notified in writing by the Director. Any person intending to use alternate magazine construction shall submit a letter application to the regional director (compliance) for transmittal to the Director, specifically describing the proposed magazine. Explosive materials may not be stored in alternate magazines before the applicant has been notified that the application has been approved.

(c) A licensee or permittee who intends to make changes in his magazines, or who intends to construct or acquire additional magazines, shall comply with § 55.63.

(d) The regulations set forth in §§ 55.221 through 55.224 pertain to the storage of display fireworks, pyrotechnic compositions, and explosive materials used in assembling fireworks and articles pyrotechnic.

(e) The provisions of § 55.202(a) classifying flash powder and bulk salutes as high explosives are mandatory after March 7, 1990:

Provided, that those persons who hold licenses or permits under this part on that date shall, with respect to the premises covered by such licenses or permits, comply with the high explosives storage requirements for flash powder and bulk salutes by March 7, 1991.

(f) Any person who stores explosive materials shall notify the authority having jurisdiction for fire safety in the locality in which the explosive materials are being stored of the type, magazine capacity, and location of each site where such explosive materials are stored. Such notification shall be made orally before the end of the day on which storage of the explosive materials commenced and in writing within 48 hours from the time such storage commenced.

[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981, as amended by T.D. ATF-293, 55 FR 3722, Feb. 5, 1990; T.D. ATF-400, 63 FR 44999, 45003, Aug. 24, 1998]

§ 55.202 Classes of explosive materials.

For purposes of this part, there are three classes of explosive materials. These classes, together with the description of explosive materials comprising each class, are as follows:

(a) High explosives. Explosive materials which can be caused to detonate by means of a blasting cap when unconfined, (for example, dynamite, flash powders, and bulk salutes). See also § 55.201(e).

(b) Low explosives. Explosive materials which can be caused to deflagrate when confined (for example, black powder, safety fuses, igniters, igniter cords, fuse lighters, and "display fireworks" classified as UN0333, UN0334, or UN0335 by the U.S. Department of Transportation regulations at 49 CFR 172.101, except for bulk salutes).

(c) Blasting agents. (For example, ammonium nitrate-fuel oil and certain water-gels (see also § 55.11).

[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981, as amended by T.D. ATF-293, 55 FR 3722, Feb. 5, 1990; T.D. ATF-400, 63 FR 44999, 45003, Aug. 24, 1998]

§ 55.203 Types of magazines.

For purposes of this part, there are five types of magazines. These types, together with the classes of explosive materials, as defined in § 55.202, which will be stored in them, are as follows:

(a) Type 1 magazines. Permanent magazines for the storage of high explosives, subject to the limitations prescribed by §§ 55.206 and 55.213. Other classes of explosive materials may also be stored in type 1 magazines.

(b) Type 2 magazines. Mobile and portable indoor and outdoor magazines for the storage of high explosives, subject to the limitations prescribed by §§ 55.206, 55.208(b), and 55.213. Other classes of explosive materials may also be stored in type 2 magazines.

(c) Type 3 magazines. Portable outdoor magazines for the temporary storage of high explosives while attended (for example, a "day-box"), subject to the limitations prescribed by §§

55.206 and 55.213. Other classes of explosives materials may also be stored in type 3 magazines.

(d) Type 4 magazines. Magazines for the storage of low explosives, subject to the limitations prescribed by §§ 55.206(b), 55.210(b), and 55.213. Blasting agents may be stored in type 4 magazines, subject to the limitations prescribed by §§ 55.206(c), 55.211(b), and 55.213. Detonators that will not mass detonate may also be stored in type 4 magazines, subject to the limitations prescribed by §§ 55.206(a), 55.210(b), and 55.213.

(e) Type 5 magazines. Magazines for the storage of blasting agents, subject to the limitations prescribed by §§ 55.206(c), 55.211(b), and 55.213.
[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981]

§ 55.204 Inspection of magazines.

Any person storing explosive materials shall inspect his magazines at least every seven days. This inspection need not be an inventory, but must be sufficient to determine whether there has been unauthorized entry or attempted entry into the magazines, or unauthorized removal of the contents of the magazines.
[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981]

§ 55.205 Movement of explosive materials.

All explosive materials must be kept in locked magazines meeting the standards in this subpart unless they are:

(a) In the process of manufacture;

(b) Being physically handled in the operating process of a licensee or user;

(c) Being used; or

(d) Being transported to a place of storage or use by a licensee or permittee or by a person who has lawfully acquired explosive materials under § 55.106.
[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981]

§ 55.206 Location of magazines.

(a) Outdoor magazines in which high explosives are stored must be located no closer to inhabited buildings, passenger railways, public highways, or other magazines in which high explosives are stored, than the minimum distances specified in the table of distances for storage of explosive materials in § 55.218.

(b) Outdoor magazines in which low explosives are stored must be located no closer to inhibited buildings, passenger railways, public highways, or other magazines in which explosive materials are stored, than the minimum distances specified in the table of distances for storage of low explosives in § 55.219, except that the table of distances in § 55.224 shall apply to the storage of display fireworks. The distances shown in § 55.219 may not be reduced by the presence of barricades.

(c)(1) Outdoor magazines in which blasting agents in quantities of more than 50 pounds are stored must be located no closer to inhabited buildings, passenger railways, or public highways than the minimum distances specified in the table of distances for storage of explosive materials in § 55.218.

(2) Ammonium nitrate and magazines in which blasting agents are stored must be located no closer to magazines in which high explosives or other blasting agents are stored than the minimum distances specified in the table of distances for the separation of ammonium nitrate and blasting agents in § 55.220. However, the minimum distances for magazines in which explosives and blasting agents are stored from inhabited buildings, etc., may not be less than the distances specified in the table of distances for storage of explosives materials in § 55.218.
[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981, as amended by T.D. ATF-293, 55 FR 3722, Feb. 5, 1990; T.D. ATF-400, 63 FR 44999, 45003, Aug. 24, 1998]

§ 55.207 Construction of type 1 magazines.

A type 1 magazine is a permanent structure: a building, an igloo or "Army-type structure", a tunnel, or a dugout. It is to be bullet-resistant, fire-resistant, weather-resistant, theft-resistant, and ventilated.

(a) Buildings. All building type magazines are to be constructed of masonry, wood, metal, or a combination of these materials, and have no openings except for entrances and ventilation. The ground around building magazines must slope away for drainage or other adequate drainage provided.

(1) Masonry wall construction. Masonry wall construction is to consist of brick, concrete, tile, cement block, or cinder block and be not less than 6 inches in thickness. Hollow masonry units used in construction must have all hollow spaces filled with well-tamped, coarse, dry sand or weak concrete (at least a mixture of one part cement and eight parts of sand with enough water to dampen the mixture while tamping in place). Interior walls are to be constructed of, or covered with, a nonsparking material.

(2) Fabricated metal wall construction. Metal wall construction is to consist of sectional sheets of steel or aluminum not less than number 14-gauge, securely fastened to a metal framework. Metal wall construction is either lined inside with brick, solid cement blocks, hardwood not less than four inches thick, or will have at least a six inch sand fill between interior and exterior walls. Interior walls are to be

constructed of, or covered with, a nonsparking material.

(3) Wood frame wall construction. The exterior of outer wood walls is to be covered with iron or aluminum not less than number 26-gauge. An inner wall of, or covered with nonsparking material will be constructed so as to provide a space of not less than six inches between the outer and inner walls. The space is to be filled with coarse, dry sand or weak concrete.

(4) Floors. Floors are to be constructed of, or covered with, a nonsparking material and shall be strong enough to bear the weight of the maximum quantity to be stored. Use of pallets covered with a nonsparking material is considered equivalent to a floor constructed of or covered with a nonsparking material.

(5) Foundations. Foundations are to be constructed of brick, concrete, cement block, stone, or wood posts. If piers or posts are used, in lieu of a continuous foundation, the space under the buildings is to be enclosed with metal.

(6) Roof. Except for buildings with fabricated metal roofs, the outer roof is to be covered with no less than number 26-guage iron or aluminum, fastened to at least 7/8 inch sheathing.

(7) Bullet-resistant ceilings or roofs. Where it is possible for a bullet to be fired directly through the roof and into the magazine at such an angle that the bullet would strike the explosives within, the magazine is to be protected by one of the following methods:

(i) A sand tray lined with a layer of building paper, plastic, or other nonporous material, and filled with not less than four inches of coarse, dry sand, and located at the tops of inner walls covering the entire ceiling area, except that portion necessary for ventilation.

(ii) A fabricated metal roof constructed of 3/16-inch plate steel lined with four inches of hardwood. (For each additional 1/16 inch of plate steel, the hardwood lining may be decreased one inch.)

(8) Doors. All doors are to be constructed of not less than 1/4 inch plate steel and lined with at least two inches of hardwood. Hinges and hasps are to be attached to the doors by welding, riveting or bolting (nuts on inside of door). They are to be installed in such a manner that the hinges and hasps cannot be removed when the doors are closed and locked.

(9) Locks. Each door is to be equipped with (i) two mortise locks; (ii) two padlock fastened in separate hasps and staples; (iii) a combination of a mortise lock and a padlock; (iv) a mortise lock that requires two keys to open; or (v) a three-point lock. Padlocks must have at least five tumblers and a casehardened shackle of at least 3/8 inch diameter. Padlocks must be protected with not less than 1/4 inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps, and staples. These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock, or bar that cannot be actuated from the outside.

(10) Ventilation. Ventilation is to be provided to prevent dampness and heating of stored explosive materials. Ventilation openings must be screened to prevent the entrance of sparks. Ventilation openings in side walls and foundations must be offset or shielded for bullet-resistant purposes. Magazines having foundation and roof ventilators with the air circulating between the side walls and the floors and between the side walls and the ceiling must have a wooden lattice lining or equivalent to prevent the packages of explosive materials from being stacked against the side walls and blocking the air circulation.

(11) Exposed metal. No sparking material is to be exposed to contact with the stored explosive materials. All ferrous metal nails in the floor and side walls, which might be exposed to contact with explosive materials, must be blind nailed, countersunk, or covered with a nonsparking lattice work or other nonsparking material.

(b) Igloos, "Army-type structures", tunnels, and dugouts. Igloo, "Army-type structure", tunnel, and dugout magazines are to be constructed of reinforced concrete, masonry, metal, or a combination of these materials. They must have an earthmound covering of not less than 24 inches on the top, sides and rear unless the magazine meets the requirements of paragraph (a)(7) of this section. Interior walls and floors must be constructed of, or covered with, a nonsparking material. Magazines of this type are also to be constructed in conformity with the requirements of paragraph (a)(4) and paragraphs (a)(8) through (11) of this section.
[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981]

§ 55.208 Construction of type 2 magazines.

A type 2 magazine is a box, trailer, semitrailer, or other mobile facility.

(a) Outdoor magazines.

(1) General. Outdoor magazines are to be bullet-resistant, fire-resistant, weather-resistant, theft-resistant, and ventilated. They are to be supported to prevent direct contact with the ground and, if less than one cubic yard in size, must be securely fastened to a fixed object. The ground around outdoor magazines must slope away for drainage or other adequate drainage provided.

When unattended, vehicular magazines must have wheels removed or otherwise effectively immobilized by kingpin locking devices or other methods approved by the Director.

(2) Exterior construction. The exterior and doors are to be constructed of not less than 1/4-inch steel and lined with at least two inches of hardwood. Magazines with top openings will have lids with water-resistant seals or which overlap the sides by at least one inch when in a closed position.

(3) Hinges and hasps. Hinges and hasps are to be attached to doors by welding, riveting, or bolting (nuts on inside of door). Hinges and hasps must be installed so that they cannot be removed when the doors are closed and locked.

(4) Locks. Each door is to be equipped with

(i) two mortise locks;

(ii) two padlocks fastened in separate hasps and staples;

(iii) a combination of a mortise lock and a padlock;

(iv) a mortise lock that requires two keys to open; or

(v) a three-point lock.

Padlocks must have at least five tumblers and a case-hardened shackle of at least 3/8-inch diameter. Padlocks must be protected with not less than 1/4-inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps, and staples.

These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock, or bar that cannot be actuated from the outside.

(b) Indoor magazines

(1) General. Indoor magazines are to be fire-resistant and theft-resistant. They need not be bullet-resistant and weather-resistant if the buildings in which they are stored provide protection from the weather and from bullet penetration.

No indoor magazine is to be located in a residence or dwelling. The indoor storage of high explosives must not exceed a quantity of 50 pounds. More than one indoor magazine may be located in the same building if the total quantity of explosive materials stored does not exceed 50 pounds. Detonators must be stored in a separate magazine (except as provided in § 55.213) and the total quantity of detonators must not exceed 5,000.

(2) Exterior construction. Indoor magazines are to be constructed of wood or metal according to one of the following specifications:

(i) Wood indoor magazines are to have sides, bottoms and doors constructed of at least two inches of hardwood and are to be well braced at the corners. They are to be covered with sheet metal of not less than number 26-gauge (.0179 inches). Nails exposed to the interior of magazines must be countersunk.

(ii) Metal indoor magazines are to have sides, bottoms and doors constructed of not less than number 12-gauge (.1046 inches) metal and be lined inside with a nonsparking material. Edges of metal covers must overlap sides at least one inch.

(3) Hinges and hasps. Hinges and hasps are to be attached to doors by welding, riveting, or bolting (nuts on inside of door). Hinges and hasps must be installed so that they cannot be removed when the doors are closed and locked.

(4) Locks. Each door is to be equipped with

(i) two mortise locks;

(ii) two padlocks fastened in separate hasps and staples;

(iii) a combination of a mortise lock and a padlock;

(iv) a mortise lock that requires two keys to open; or

(v) a three-point lock.

Padlocks must have at least five tumblers and a case-hardened shackle of at least 3/8-inch diameter. Padlocks must be protected with not less than 1/4-inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps, and staples.

Indoor magazines located in secure rooms that are locked as provided in this subparagraph may have each door locked with one steel padlock (which need not be protected by a steel hood) having at least five tumblers and a case-hardened shackle of at least 3/8-inch diameter, if the door hinges and lock hasp are securely fastened to the magazine.

These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock, or bar that cannot be actuated from the outside.

(c) Detonator boxes. Magazines for detonators in quantities of 100 or less are to have sides, bottoms and doors constructed of not less than number 12-gauge (.1046 inches) metal and lined with a nonsparking material. Hinges and hasps must be attached so they cannot be removed from the outside. One steel padlock (which need not be protected by a steel hood) having at least five tumblers and a case-hardened shackle of at least 3/8-inch diameter is sufficient for locking purposes.
[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981]

§ 55.209 Construction of type 3 magazines.

A type 3 magazine is a "day-box" or other portable magazine. It must be fire-resistant, weather-resistant, and theft-resistant. A type 3

magazine is to be constructed of not less than number 12-gauge (.1046 inches) steel, lined with at least either 1/2-inch plywood or 1/2-inch Masonite-type hardboard.

Doors must overlap sides by at least one inch. Hinges and hasps are to be attached by welding, riveting or bolting (nuts on inside).

One steel padlock (which need not be protected by a steel hood) having at least five tumblers and a case-hardened shackle of at least 3/8-inch diameter is sufficient for locking purposes. Explosive materials are not to be left unattended in type 3 magazines and must be removed to type 1 or 2 magazines for unattended storage.
[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981]

§ 55.210 Construction of type 4 magazines.

A type 4 magazine is a building, igloo or "Army-type structure", tunnel, dugout, box, trailer, or a semitrailer or other mobile magazine.

(a) Outdoor magazines

(1) General. Outdoor magazines are to be fire-resistant, weather-resistant, and theft-resistant. The ground around outdoor magazines must slope away for drainage or other adequate drainage be provided. When unattended, vehicular magazines must have wheels removed or otherwise be effectively immobilized by kingpin locking devices or other methods approved by the Director.

(2) Construction. Outdoor magazines are to be constructed of masonry, metal-covered wood, fabricated metal, or a combination of these materials. Foundations are to be constructed of brick, concrete, cement block, stone, or metal or wood posts. If piers or posts are used, in lieu of a continuous foundation, the space under the building is to be enclosed with fire-resistant material. The walls and floors are to be constructed of, or covered with, a nonsparking material or lattice work. The doors must be metal or solid wood covered with metal.

(3) Hinges and hasps. Hinges and hasps are to be attached to doors by welding, riveting, or bolting (nuts on inside of door). Hinges and hasps must be installed so that they cannot be removed when the doors are closed and locked.

(4) Locks. Each door is to be equipped with

(i) two mortise locks;

(ii) two padlocks fastened in separate hasps and staples;

(iii) a combination of a mortise lock and a padlock;

(iv) a mortise lock that requires two keys to open; or

(v) a three-point lock.

Padlocks must have at least five tumblers and case-hardened shackle of at least 3/8 inch diameter. Padlocks must be protected with not less than 1/4 inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps, and staples.

These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock, or bar that cannot be actuated from the outside.

(b) Indoor magazine

(1) General. Indoor magazines are to be fire-resistant and theft-resistant. They need not be weather-resistant if the buildings in which they are stored provide protection from the weather.

No indoor magazine is to be located in a residence or dwelling. The indoor storage of low explosives must not exceed a quantity of 50 pounds. More than one indoor magazine may be located in the same building if the total quantity of explosive materials stored does not exceed 50 pounds. Detonators that will not mass detonate must be stored in a separate magazine and the total number of electric detonators must not exceed 5,000.

(2) Construction. Indoor magazines are to be constructed of masonry, metal-covered wood, fabricated metal, or a combination of these materials. The walls and floors are to be constructed of, or covered with, a nonsparking material. The doors must be metal or solid wood covered with metal.

(3) Hinges and hasps. Hinges and hasps are to be attached to doors by welding, riveting, or bolting (nuts on inside of door). Hinges and hasps must be installed so that they cannot be removed when the doors are closed and locked.

(4) Locks. Each door is to be equipped with

(i) two mortise locks;

(ii) two padlocks fastened in separate hasps and staples;

(iii) a combination of a mortise lock and padlock;

(iv) a mortise lock that requires two keys to open; or

(v) a three-point lock.

Padlocks must have at least five tumblers and a case-hardened shackle of at least 3/8 inch diameter. Padlocks must be protected with not less than 1/4 inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps, and staples.

Indoor magazines located in secure rooms that are locked as provided in this subparagraph may have each door locked with one steel padlock (which need not be protected by a steel hood) having at least five tumblers and a case-hardened

shackle of at least 3/8 inch diameter, if the door hinges and lock hasp are securely fastened to the magazine.

These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock, or bar that cannot be actuated from the outside.

[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981]

§ 55.211 Construction of type 5 magazines.

A type 5 magazine is a building, igloo or "Army-type structure", tunnel, dugout, bin, box, trailer, or a semitrailer or other mobile facility.

(a) Outdoor magazines

(1) General. Outdoor magazines are to be weather-resistant and theft-resistant. The ground around magazines must slope away for drainage or other adequate drainage be provided. When unattended, vehicular magazines must have wheels removed or otherwise be effectively immobilized by kingpin locking devices or other methods approved by the Director.

(2) Construction. The doors are to be constructed of solid wood or metal.

(3) Hinges and hasps. Hinges and hasps are to be attached to doors by welding, riveting, or bolting (nuts on inside of door). Hinges and hasps must be installed so that they cannot be removed when the doors are closed and locked.

(4) Locks. Each door is to be equipped with

(i) two mortise locks;

(ii) two padlocks fastened in separate hasps and staples;

(iii) a combination of a mortise lock and a padlock;

(iv) a mortise lock that requires two keys to open; or

(v) a three-point lock.

Padlocks must have at least five tumblers and a case-hardened shackle of at least 3/8 inch diameter. Padlocks must be protected with not less than 1/4 inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps, and staples.

Trailers, semitrailers, and similar vehicular magazines may, for each door, be locked with one steel padlock (which need not be protected by a steel hood) having at least five tumblers and a case-hardened shackle of at least 3/8 inch diameter, if the door hinges and lock hasp are securely fastened to the magazine and to the door frame.

These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock, or bar that cannot be actuated from the outside.

(5) Placards. The placards required by Department of Transportation regulations at 49 CFR part 172, subpart F, for the transportation of blasting agents shall be displayed on all magazines.

(b) Indoor magazines

(1) General. Indoor magazines are to be theft-resistant. They need not be weather-resistant if the buildings in which they are stored provide protection from the weather.

No indoor magazine is to be located in a residence or dwelling. Indoor magazines containing quantities of blasting agents in excess of 50 pounds are subject to the requirements of § 55.206 of this subpart.

(2) Construction. The doors are to be constructed of wood or metal.

(3) Hinges and hasps. Hinges and hasps are to be attached to doors by welding, riveting, or bolting (nuts on inside). Hinges and hasps must be installed so that they cannot be removed when the doors are closed and locked.

(4) Locks. Each door is to be equipped with

(i) two mortise locks;

(ii) two padlocks fastened in separate hasps and staples;

(iii) a combination of a mortise lock and a padlock;

(iv) a mortise lock that requires two keys to open; or

(v) a three-point lock.

Padlocks must have at least five tumblers and a case-hardened shackle of at least 3/8 inch diameter. Padlocks must be protected with not less than 1/4 inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps, and staples.

Indoor magazines located in secure rooms that are locked as provided in this subparagraph may have each door locked with one steel padlock (which need not be protected by a steel hood) having at least five tumblers and a case-hardened shackle of at least 3/8 inch diameter, if the door hinges and lock hasps are securely fastened to the magazine and to the door frame.

These requirements do not apply to magazine doors that are adequately secured on the inside by means of a bolt, lock, or bar that cannot be actuated from the outside.

[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981, as amended by T.D. ATF-298, 55 FR 21863, May 30, 1990]

§ 55.212 Smoking and open flames.

Smoking, matches, open flames, and spark producing devices are not permitted:

(a) In any magazine;

(b) Within 50 feet of any outdoor magazine; or

(c) Within any room containing an indoor magazine.
[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981]

§ 55.213 Quantity and storage restrictions.

(a) Explosive materials in excess of 300,000 pounds or detonators in excess of 20 million are not to be stored in one magazine unless approved by the Director.

(b) Detonators are not to be stored in the same magazine with other explosive materials, except under the following circumstances:

(1) In a type 4 magazine, detonators that will not mass detonate may be stored with electric squibs, safety fuse, igniters, and igniter cord.

(2) In a type 1 or type 2 magazine, detonators may be stored with delay devices and any of the items listed in paragraph (b)(1) of this section.
[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981]

§ 55.214 Storage within types 1, 2, 3, and 4 magazines.

(a) Explosive materials within a magazine are not to be placed directly against interior walls and must be stored so as not to interfere with ventilation. To prevent contact of stored explosive materials with walls, a nonsparking lattice work or other nonsparking material may be used.

(b) Containers of explosive materials are to be stored so that marks are visible. Stocks of explosive materials are to be stored so they can be easily counted and checked upon inspection.

(c) Except with respect to fiberboard or other nonmetal containers, containers of explosive materials are not to be unpacked or repacked inside a magazine or within 50 feet of a magazine, and must not be unpacked or repacked close to other explosive materials. Containers of explosive materials must be closed while being stored.

(d) Tools used for opening or closing containers of explosive materials are to be of nonsparking materials, except that metal slitters may be used for opening fiberboard containers. A wood wedge and a fiber, rubber, or wooden mallet are to be used for opening or closing wood containers of explosive materials. Metal tools other than nonsparking transfer conveyors are not to be stored in any magazine containing high explosives.
[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981]

§ 55.215 Housekeeping.

Magazines are to be kept clean, dry, and free of grit, paper, empty packages and containers, and rubbish. Floors are to be regularly swept. Brooms and other utensils used in the cleaning and maintenance of magazines must have no spark-producing metal parts, and may be kept in magazines. Floors stained by leakage from explosive materials are to be cleaned according to instructions of the explosives manufacturer. When any explosive material has deteriorated it is to be destroyed in accordance with the advice or instructions of the manufacturer. The area surrounding magazines is to be kept clear of rubbish, brush, dry grass, or trees (except live trees more than 10 feet tall), for not less than 25 feet in all directions. Volatile materials are to be kept a distance of not less than 50 feet from outdoor magazines. Living foliage which is used to stabilize the earthen covering of a magazine need not be removed.
[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981]

§ 55.216 Repair of magazines.

Before repairing the interior of magazines, all explosive materials are to be removed and the interior cleaned. Before repairing the exterior of magazines, all explosive materials must be removed if there exists any possibility that repairs may produce sparks or flame. Explosive materials removed from magazines under repair must be

(a) placed in other magazines appropriate for the storage of those explosive materials under this subpart, or

(b) placed a safe distance from the magazines under repair where they are to be properly guarded and protected until the repairs have been completed.
T.D. ATF-87, 46 FR 40384, Aug. 7, 1981.

§ 55.217 Lighting.

(a) Battery-activated safety lights or battery-activated safety lanterns may be used in explosives storage magazines.

(b) Electric lighting used in any explosives storage magazine must meet the standards prescribed by the "National Electrical Code," (National Fire Protection Association, NFPA 70-81), for the conditions present in the magazine at any time. All electrical switches are to be located outside of the magazine and also meet the standards prescribed by the National Electrical Code.

(c) Copies of invoices, work orders or similar documents which indicate the lighting complies with the National Electrical Code must be available for inspection by ATF officers.
[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981]

§ 55.218 Table of distances for storage of explosive materials.

Quantity of Explosives		Distances in feet							
Pounds over	Pounds not over	Inhabited buildings		Public highways with traffic volume 3000 or less vehicles/day		Passenger railways--public highways with traffic volume of more than 3,000 vehicles bay		Separation of magazines	
		Barricaded	Unbarri-aded	Barricaded	Unbarricaded[B]	arricaded	Unbarri-caded	Barricaded	Unbarri-caded
0	5	70	140	30	60	51	102	6	12
5	10	90	180	35	70	64	128	8	16
10	20	110	220	45	90	81	162	10	20
20	30	125	250	50	100	93	186	11	22
30	40	140	280	55	110	103	206	12	24
40	50	150	300	60	120	110	220	14	28
50	75	170	340	70	140	127	254	15	30
75	100	190	380	75	150	139	278	16	32
100	125	200	400	80	160	150	300	18	36
125	150	215	430	85	170	159	318	19	38
150	200	235	470	95	190	175	350	21	42
200	250	255	510	105	210	189	378	23	46
250	300	270	540	110	220	201	402	24	48
300	400	295	590	120	240	221	442	27	54
400	500	320	640	130	260	238	476	29	58
500	600	340	680	135	270	253	506	31	62
600	700	355	710	145	290	266	532	32	64
700	800	375	750	150	300	278	556	33	66
800	900	390	780	155	310	289	578	35	70
900	1,000	400	800	160	320	300	600	36	72
1,000	1,200	425	850	165	330	318	636	39	78
1,200	1,400	450	900	170	340	336	672	41	82
1,400	1,600	470	940	175	350	351	702	43	86
1,600	1,800	490	980	180	360	366	732	44	88
1,800	2,000	505	1,010	185	370	378	756	45	90
2,000	2,500	545	1,090	190	380	408	816	49	98
2,500	3,000	580	1,160	195	390	432	864	52	104
3,000	4,000	635	1,270	210	420	474	948	58	116
4,000	5,000	685	1,370	225	450	513	1,026	61	122
5,000	6,000	730	1,460	235	470	546	1,092	65	130
6,000	7,000	770	1,540	245	490	573	1,146	68	136
7,000	8,000	800	1,600	250	500	600	1,200	72	144
8,000	9,000	835	1,670	255	510	624	1,248	75	150
9,000	10,000	865	1,730	260	520	645	1,290	78	156
10,000	12,000	875	1,750	270	540	687	1,374	82	164
12,000	14,000	885	1,770	275	550	723	1,446	87	174
14,000	16,000	900	1,800	280	560	756	1,512	90	180
16,000	18,000	940	1,880	285	570	786	1,572	94	188
18,000	20,000	975	1,950	290	580	813	1,626	98	196
20,000	25,000	1,055	2,000	315	630	876	1,752	105	210
25,000	30,000	1,130	2,000	340	680	933	1,866	112	224
30,000	35,000	1,205	2,000	360	720	981	1,962	119	238
35,000	40,000	1,275	2,000	380	760	1,026	2,000	124	248
40,000	45,000	1,340	2,000	400	800	1,068	2,000	129	258
45,000	50,000	1,400	2,000	420	840	1,104	2,000	135	270
50,000	55,000	1,460	2,000	440	880	1,140	2,000	140	280
55,000	60,000	1,515	2,000	455	910	1,173	2,000	145	290
60,000	65,000	1,565	2,000	470	940	1,206	2,000	150	300
65,000	70,000	1,610	2,000	485	970	1,236	2,000	155	310
70,000	75,000	1,655	2,000	500	1,000	1,263	2,000	160	320
75,000	80,000	1,695	2,000	510	1,020	1,293	2,000	165	330
80,000	85,000	1,730	2,000	520	1,040	1,317	2,000	170	340
85,000	90,000	1,760	2,000	530	1,060	1,344	2,000	175	350
90,000	95,000	1,790	2,000	540	1,080	1,368	2,000	180	360
95,000	100,000	1,815	2,000	545	1,090	1,392	2,000	185	370
100,000	110,000	1,835	2,000	550	1,100	1,437	2,000	195	390
110,000	120,000	1,855	2,000	555	1,110	1,479	2,000	205	410
120,000	130,000	1,875	2,000	560	1,120	1,521	2,000	215	430
130,000	140,000	1,890	2,000	565	1,130	1,557	2,000	225	450
140,000	150,000	1,900	2,000	570	1,140	1,593	2,000	235	470
150,000	160,000	1,935	2,000	580	1,160	1,629	2,000	245	490
160,000	170,000	1,965	2,000	590	1,180	1,662	2,000	255	510
170,000	180,000	1,990	2,000	600	1,200	1,695	2,000	265	530
180,000	190,000	2,010	2,010	605	1,210	1,725	2,000	275	550
190,000	200,000	2,030	2,030	610	1,220	1,755	2,000	285	570
200,000	210,000	2,055	2,055	620	1,240	1,782	2,000	295	590
210,000	230,000	2,100	2,100	635	1,270	1,836	2,000	315	630
230,000	250,000	2,155	2,155	650	1,300	1,890	2,000	335	670
250,000	275,000	2,215	2,215	670	1,340	1,950	2,000	360	720
275,000	300,000	2,275	2,275	690	1,380	2,000	2,000	385	770

Table: AMERICAN TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVES (December 1910), as Revised and Approved by the Institute of Makers of Explosives-July, 1991.

Notes to the Table of Distances for Storage of Explosives

(1) Terms found in the table of distances for storage of explosive materials are defined in § 55.11.

(2) When two or more storage magazines are located on the same property, each magazine must comply with the minimum distances specified from inhabited buildings, railways, and highways, and, in addition, they should be separated from each other by not less than the distances shown for "Separation of Magazines," except that the quantity of explosives contained in cap magazines shall govern in regard to the spacing of said cap magazines from magazines containing other explosives. If any two or more magazines are separated from each other by less than the specified "Separation of Magazines" distances, then such two or more magazines, as a group, must be considered as one magazine, and the total quantity of explosives stored in such group must be treated as if stored in a single magazine located on the site of any magazine of the group, and must comply with the minimum of distances specified from other magazines, inhabited buildings, railways, and highways.

(3) All types of blasting caps in strengths through No. 8 cap should be rated at 11/2 lbs. of explosives per 1,000 caps. For strengths higher than No. 8 cap, consult the manufacturer.

(4) For quantity and distance purposes, detonating cord of 50 or 60 grains per foot should be calculated as equivalent to 9 lbs. of high explosives per 1,000 feet. Heavier or lighter core loads should be rated proportionately.

[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981; T.D. ATF-400, 63 FR 44999, 45003, Aug. 24, 1998]

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§ 55.219 Table of distances for storage of low explosives.

Pounds		From inhabited buiding distance (feet)	From public railroad and highway distance (feet)	From above ground magazine (feet)
Over	Not over			
0	1,000	75	75	50
1,000	5,000	115	115	75
5,000	10,000	150	150	100
10,000	20,000	190	190	125
20,000	30,000	215	215	145
30,000	40,000	235	235	155
40,000	50,000	250	250	165
50,000	60,000	260	260	175
60,000	70,000	270	270	185
70,000	80,000	280	280	190
80,000	90,000	295	295	195
90,000	100,000	300	300	200
100,000	200,000	375	375	250
200,000	300,000	450	450	300

Table: DEPARTMENT OF DEFENSE AMMUNITION AND EXPLOSIVES STANDARDS, TABLE 5-4.1 EXTRACT; 4145.27 M, March 1969

§ 55.220 Table of separation distances of ammonium nitrate and blasting agents from explosives or blasting agents.

Donor weight (pounds)		Minimum separation distance of acceptor from donor when barricaded (feet)		Minimum thickness of artificial barricades (inches)
Over	Not over	Ammonium nitrate	Blasting agent	
0	100	3	11	12
100	300	4	14	12
300	600	5	18	12
600	1,000	6	22	12
1,000	1,600	7	25	12
1,600	2,000	8	29	12
2,000	3,000	9	32	15
3,000	4,000	10	36	15
4,000	6,000	11	40	15
6,000	8,000	12	43	20
8,000	10,000	13	47	20
10,000	12,000	14	50	20
12,000	16,000	15	54	25
16,000	20,000	16	58	25
20,000	25,000	18	65	25
25,000	30,000	19	68	30
30,000	35,000	20	72	30
35,000	40,000	21	76	30
40,000	45,000	22	79	35
45,000	50,000	23	83	35
50,000	55,000	24	86	35
55,000	60,000	25	90	35
60,000	70,000	26	94	40
70,000	80,000	28	101	40
80,000	90,000	30	108	40
90,000	100,000	32	115	40
100,000	120,000	34	122	50
120,000	140,000	37	133	50
140,000	160,000	40	144	50
160,000	180,000	44	158	50
180,000	200,000	48	173	50
200,000	220,000	52	187	60
220,000	250,000	56	202	60
250,000	275,000	60	216	60
275,000	300,000	64	230	60

Table: NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) OFFICIAL STANDARD NO. 492, 1968

Notes of Table of Separation Distances of Ammonium Nitrate and Blasting Agents From Explosives or Blasting Agents

(1) This table specifies separation distances to prevent explosion of ammonium nitrate and ammonium nitrate-based blasting agents by propagation from nearby stores of high explosives or blasting agents referred to in the table as the "donor." Ammonium nitrate, by itself, is not considered to be a donor when applying this table. Ammonium nitrate, ammonium nitrate-fuel oil or combinations thereof are acceptors. If stores of ammonium nitrate are located within the sympathetic detonation distance of explosives or blasting agents, one-half the mass of the ammonium nitrate is to be included in the mass of the donor.

(2) When the ammonium nitrate and/or blasting agent is not barricaded, the distances shown in the table must be multiplied by six. These distances allow for the possibility of high velocity metal fragments from mixers, hoppers, truck bodies, sheet metal structures, metal containers, and the like

which may enclose the "donor." Where explosives storage is in bullet-resistant magazines or where the storage is protected by a bullet-resistant wall, distances and barricade thicknesses in excess of those prescribed in the table in § 55.218 are not required.

(3) These distances apply to ammonium nitrate that passes the insensitivity test prescribed in the definition of ammonium nitrate fertilizer issued by the Fertilizer Institute.[1] Ammonium nitrate failing to pass the test must be stored at separation distances in accordance with the table in § 55.218.

[1] Definition and Test Procedures for Ammonium Nitrate Fertilizer, Fertilizer Institute 1015-18th St. N.W. Washington, D.C. 20036.

(4) These distances apply to blasting agents which pass the insensitivity test prescribed in regulations of the U.S. Department of Transportation (49 CFR part 173).

(5) Earth or sand dikes, or enclosures filled with the prescribed minimum thickness of earth or sand are acceptable artificial barricades. Natural barricades, such as hills or timber of sufficient density that the surrounding exposures which require protection cannot be seen from the "donor" when the trees are bare of leaves, are also acceptable.

(6) For determining the distances to be maintained from inhabited buildings, passenger railways, and public highways, use the table in § 55.218.

[T.D. ATF-87, 46 FR 40384, Aug. 7, 1981]

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§ 55.221 Requirements for display fireworks, pyrotechnic compositions, and explosive materials used in assembling fireworks or articles pyrotechnic.

(a) Display fireworks, pyrotechnic compositions, and explosive materials used to assemble fireworks and articles pyrotechnic shall be stored at all times as required by this Subpart unless they are in the process of manufacture, assembly, packaging, or are being transported.

(b) No more than 500 pounds (227 kg) of pyrotechnic compositions or explosive materials are permitted at one time in any fireworks mixing building, any building or area in which the pyrotechnic compositions or explosive materials are pressed or otherwise prepared for finishing or assembly, or any finishing or assembly building. All pyrotechnic compositions or explosive materials not in immediate use will be stored in covered, non-ferrous containers.

(c) The maximum quantity of flash powder permitted in any fireworks process building is 10 pounds (4.5 kg).

(d) All dry explosive powders and mixtures, partially assembled display fireworks, and finished display fireworks shall be removed from fireworks process buildings at the conclusion of a day's operations and placed in approved magazines.

[T.D. ATF-293, 55 FR 3722, Feb. 5, 1990; T.D. ATF-400, 63 FR 44999, 45004, Aug. 24, 1998]

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§ 55.222 Table of distances between fireworks process buildings and between fireworks process and fireworks nonprocess buildings.

Net weight of fireworks1 (pounds)	Display fireworks2 (feet)	Consumer fireworks3 (feet)
0–100	57	37
101–200	69	37
201–300	77	37
301–400	85	37
401–500	91	37
Above 500	Not permitted4 5	Not Permitted4 5

[1] Net weight is the weight of all pyrotechnic compositions, and explosive materials and fuse only.

[2] The distances in this column apply only with natural or artificial barricades. If such barricades are not used, the distances must be doubled.

[3] While consumer fireworks or articles pyrotechnic in a finished state are not subject to regulation, explosive materials used to manufacture or assemble such fireworks or articles are subject to regulation. Thus, fireworks process buildings where consumer fireworks or articles pyrotechnic are being processed shall meet these requirements.

[4] A maximum of 500 pounds of in-process pyrotechnic compositions, either loose or in partially-assembled fireworks, is permitted in any fireworks process building. Finished display fireworks may not be stored in a fireworks process building.

[5] A maximum of 10 pounds of flash powder, either in loose form or in assembled units, is permitted in any fireworks process building. Quantities in excess of 10 pounds must be kept in an approved magazine.

[T.D. ATF-293, 55 FR 3723, Feb. 5, 1990; T.D. ATF-400, 63 FR 44999, 45004, Aug. 24, 1998]

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§ 55.223 Table of distances between fireworks process buildings and other specified areas.

Net weight of fireworks1 (pounds)	Display fireworks1 (feet)	Consumer fireworks2 (feet)
0–100	200	25
101–200	200	50
201–300	200	50
301–400	200	50
401–500	200	50
Above 500	Not permitted	Not Permitted

[1] Net weight is the weight of all pyrotechnic compositions, and explosive materials and fuse only.

[2] While consumer fireworks or articles pyrotechnic in a finished state are not subject to regulation, explosive materials used to manufacture or assemble such fireworks or articles are subject to regulation. Thus, fireworks process buildings where consumer fireworks or articles pyrotechnic are being processed shall meet these requirements.

[3] This table does not apply to the separation distances between fireworks process buildings (see § 55.222) and between magazines (see §§ 55.218 and 55.224).

[4] The distances in this table apply with or without artificial or natural barricades or screen barricades. However, the use of barricades is highly recommended.

[5] No work of any kind, except to place or move items other than explosive materials from storage, shall be conducted in any building designated as a warehouse. A fireworks plant warehouse is not subject to § 55.222 or this section, tables of distances.

[T.D. ATF-293, 55 FR 3723, Feb. 5, 1990; T.D. ATF-400, 63 FR 44999, 45004, Aug. 24, 1998]

§ 55.224 Table of distances for the storage of display fireworks (except bulk salutes).

Net weight of firework1 (pounds)	Distance between magazine and inhabited building, passenger railway, or public highway3 4 (feet)	Distance between magazines2 3 (feet)
0–1000	150	100
1001–5000	230	150
5001–10000	300	200
Above 10000	Use Table §55.218	

[1] Net weight is the weight of all pyrotechnic compositions, and explosive materials and fuse only.

[2] For the purposes of applying this table, the term magazine" also includes fireworks shipping buildings for display fireworks.

[3] For fireworks storage magazines in use prior to (30 days from the date of publication of the final rule in the Federal Register), the distances in this table may be halved if properly barricaded between the magazine and potential receptor sites.

[4] This table does not apply to the storage of bulk salutes. Use table at § 55.218.

[T.D. ATF-293, 55 FR 3723, Feb. 5, 1990; T.D. ATF-400, 63 FR 44999, 45004, Aug. 24, 1998]

APPENDIX S

CALCULATIONS

SECONDARY CONTAINMENT

Concrete Burner Pad

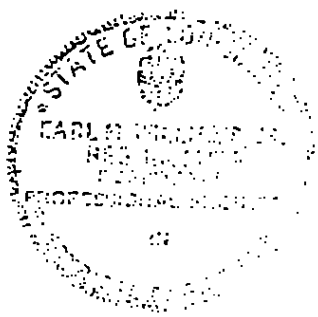
	ft^3
Total volume	322.6
Raised concrete pad	- 18
Concrete ramp to pad	- 34.6
Volume of blocks under pad	- 4.7
Burner trough	- 12
	= 253.3 ft^3
Effective containment volume converted to gallons	1894.7 gal
12 inches of rainfall on containment area	1609.0 gal
Freeboard	2.1 inches

Prep Area

	ft^3
Total volume	240.0
No subtractions for objects located in the containment area	- 0
	= 240.0
Effective containment volume converted to gallons	1795.0 gal

Ash Storage

	ft^3
Total volume	392.0
No subtractions for objects located in the containment area	- 0
	392.0 ft^3
Effective containment volume converted to cubic yards	14.5 yd^3

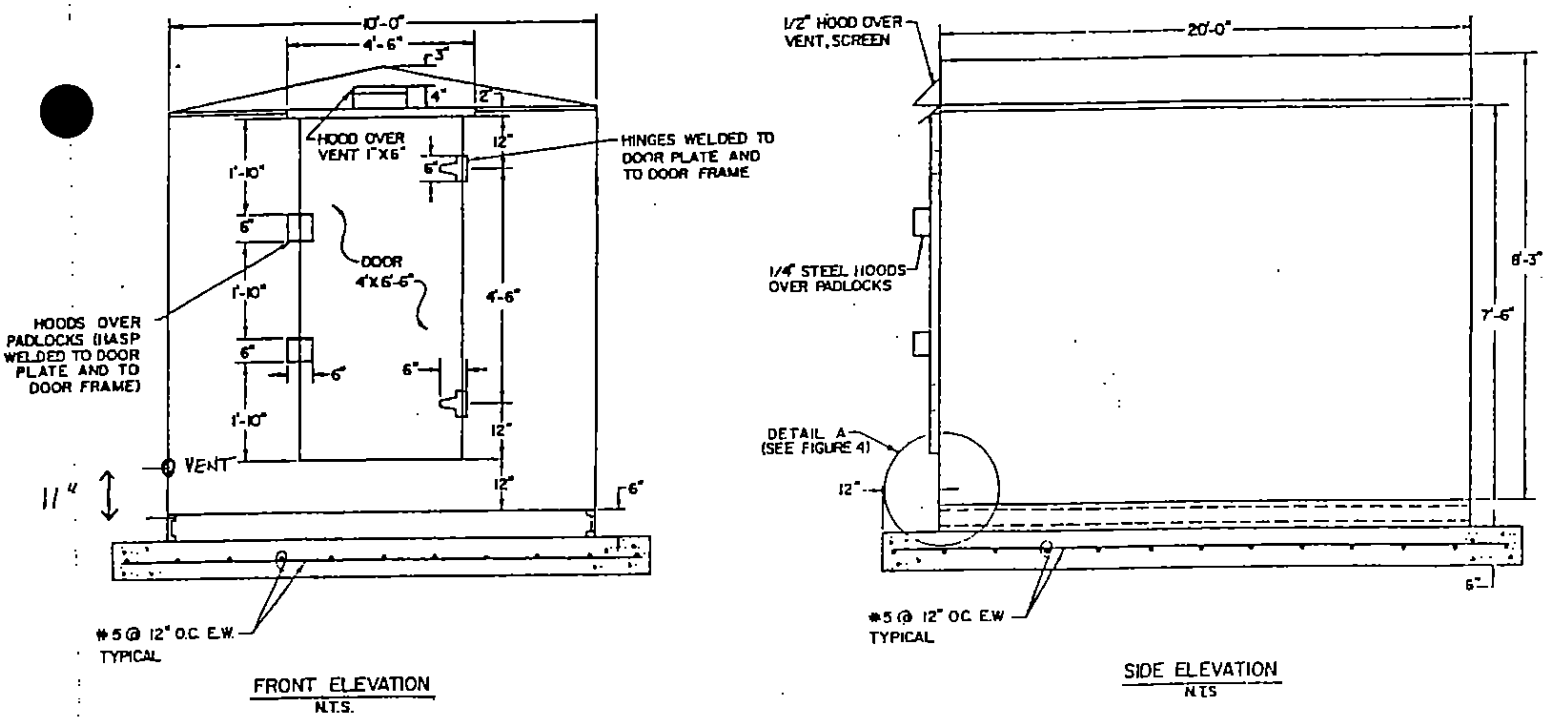


SECONDARY CONTAINMENT
(Continued)

Truck Parking/Staging Area

	ft^3	
Total volume	2184.0	
No subtractions for objects located in the containment area	- 0	
	2184.0	ft^3
Effective containment volume converted to gallons	16336.3	gal
12 inches of rainfall on containment area	12805.8	gal
10-percent of 80 55-gallon drums stored in containment area	440.0	gal
Freeboard	3.4	inches

STORAGE MAGAZINES 8, 9 & 10



Storage Magazine (8, 9, and 10) Liquid Containment Calculation

Each magazine is 20 feet long and 10 feet wide. A vent hole is 11 inches above the steel floor. This vent hole is not presently, but could be extended in height with a riser pipe. Presently, the volume available for containment is:

20 feet x 10 feet x 11inches/12inches (0.91 feet) = 182 cubic feet

182 cubic feet x 7.48 gallons/cubic feet = 1,362 gallons

Although in practice the maximum volume of liquids has never been stored in a magazine, the maximum volume would be 4 rows of 8 drums to fit in the floor space and allow aisle access. Therefore:

4 rows x 8 drums x 55 gallons/drum = 1,760 gallons

Using 10% of the maximum volume, 176 gallons is less than the containment volume of 1,362 gallons and containment is adequate.

APPENDIX T

RESPONSES TO "IT" QUESTIONS

Responses to "IT" Decision Questions

Have the potential and real adverse environmental effects of the proposed facility been avoided to maximum extent possible?

The Clean Harbors Colfax, LLC has been safely operated since it was originally permitted in 1993. At the time the facility became permitted for RCRA storage and treatment the Department required that the "IT Decision Questions" regarding siting of new facilities be answered. Based on the original responses given at the time the original RCRA permit was being considered and the subsequent operations of the facility, including environmental monitoring that has been performed on the site, the facility has demonstrated there have been no adverse environmental effects observed at the site.

A. *What are the potential environmental impacts of the permittee's proposed facility?*

The facility only provides RCRA (hazardous waste) storage and thermal treatment for reactive and explosive wastes at the facility. Thermal treatment of reactive wastes presents the following potential adverse effects:

- **Physical injury associated with an unplanned or uncontrolled fire or explosion;**
- **Direct inhalation of combustion byproducts;**
- **Deposition of particulate matter created during the combustion process on adjacent land areas; and**
- **Storm water run-off.**

1. *What waste will be handled?*

The facility will only manage RCRA reactive and explosive wastes. Some of these wastes may also carry other characteristic waste codes as a result of the formulation of the material to be processed.

The following wastes may be managed at the facility: D001; D002, D003; D004; D005; D006; D007; D008; D010; D011; D030; K044; K045; K046; P009; P048; P065; P081; P105, P112; U069; U088; U098; U105; U108; U115; U117; U133; U160; and U234

Reactive wastes that are classified due to the potential to generate cyanide or sulfide are not accepted by the facility.

a. *Classes of chemicals*

As indicated above the facility will only manage reactive and explosive chemicals. These wastes are normally but not limited to nitrated compounds.

b. *Quantities (hazardous and non-hazardous)*

The maximum permitted quantity of the hazardous waste that can be present at the site at any time is 55,950 pounds of net explosive weight. This quantity was determined in accordance with the Bureau of Alcohol, Tobacco, and Firearms (ATF) regulations governing the storage of explosives.

c. *Physical and chemical characteristics*

The wastes, reactive and explosive, to be stored and treated are all received from off-site generators and may be in either solid or liquid form. Therefore, the waste is stored in ATF-approved magazines until it is to be processed. In the event liquid waste is received, it will be stored in a magazine provided with adequate secondary containment.

d. *Hazardous waste classification (listed, characteristic, etc.)*

The following wastes may be managed at the facility: D001; D002, D003; D004; D005; D006; D007; D008; D010; D011; D030; K044; K045; K046; P009; P048; P065; P081; P105, P112; U069; U088; U098; U105; U108; U115; U117; U133; U160; and U234.

2. *How will they be handled?*

The waste managed at the facility will come from off-site generators and will be transported to the facility by over the road trucks. All waste activities are conducted either in storage or process areas provided with adequate secondary containment and supervision.

a. *Treatment*

The treatment units located at the facility consist of concrete or steel burning units located on a large curbed cement floor. The burners are located well within the perimeter of the concrete area to insure that potential residuals from the burning process are all contained. In addition, the facility routinely monitors the site for residuals and environmental soil samples are collected as prescribed in the current permit to determine if any deposition of residuals has occurred outside the treatment area. To date all analyses indicate that no contamination has occurred.

b. *Storage*

The waste is stored in ATF-approved and licensed storage magazines. All magazines closely follow ATF requirements for minimum separation distances that explosives can be stored in relation to one another.

c. *Disposal*

No disposal operations are conducted at the facility. All treatment residuals are evaluated and, where appropriate, they are recycled or disposed off-site.

3. *Sources of waste*

a. *On-site generation (type and percentage of total handled)*

The facility will only generate treatment residues as a result of the burning process. Some of the residues (metal) will be acceptable for recycling. This amount typically represents approximately 260,000 pounds per year. Other residues such as ash or non-recoverable metal and debris will be evaluated and shipped off as non-hazardous or hazardous waste to an approved and permitted facility. Nonhazardous waste represents approximately 140 cubic yards per year and hazardous represents 20 cubic yards per year.

b. *Off-site generation (type and percentage of total handled)*

As indicated above, the facility does not generate any reactive or explosive wastes, only treatment residuals from treating off-site generated wastes. The quantity of off-site generated wastes received at the facility is approximately 1,200,000 pounds per year of waste, which represents 420,000 pounds of net explosive weight, a small percentage of the total tonnage managed at the facility due to the weights of the containers constructed to hold the explosives. An example would be oil field shape charges where the explosive is contained in a metal container.

4. *Where will waste be shipped if not handled at the site?*

Due to the extensive review and approval process, and specialty manufacturers who generate the waste there are no instances where waste will not be accepted and treated once it arrives at the facility as long as it meets the profile description generated during the approval process. If it does not match the approved profile the waste will be shipped back to the generator.

5. *What wastes will remain on the site permanently?*

Once Clean Harbors has decided that there is no longer a need for the facility and all storage and treatment operations have been completed, the facility will notify the Department of its intention to close. All wastes will be treated and all treatment residuals will be shipped offsite for either recycling or disposal. Once all wastes and treatment residuals have been removed, the RCRA units will be decontaminated according to the approved closure plan and the decontamination residuals will be properly disposed off-site.

B. *By which of the following potential pathways could releases of hazardous materials from the proposed facility endanger local residents or other living organisms?*

As indicated above, the facility has conducted numerous environmental monitoring events and all data indicate that the facility is not having an adverse effect on the environment or local residents. The risk assessment that was completed and submitted to both the USEPA and LADEQ in 1993 did not indicate any unacceptable risks to either the environment or to human health.

1. *Air*

During the term of the existing RCRA permit, the facility conducted routine air monitoring events as specified by the permit, and the results indicated no impact on the monitoring sites, which represent the location of the maximum exposed individual. Because the theoretical emissions are so small, the facility also operates under the authority of a LADEQ small source air permit.

2. *Water*

The facility currently has an NPDES Storm Water General Permit that covers the discharge of the storm water run-off for the treatment area. This permit has been in place for the duration of the RCRA treatment operations. Historically, chemical analyses indicate that the quality of the discharge is well within permit limitations; therefore, there is no threat to living organisms in the receiving stream.

3. *Soil*

As required by the conditions of the current RCRA permit, the facility has routinely monitored the soils in the area adjacent to the thermal treatment unit. All monitoring locations that are specified by the RCRA permit were mutually agreed upon by the Department and Clean Harbors prior to initiating treatment operations. As indicated above, the results from the soil samplings do not indicate any impact to the surrounding environment.

4. *Food*

The area in and around the vicinity of the facility is mainly woodland. The treatment and storage areas represent 43 acres located centrally in a tract of 622.80 acres. The natural buffer of site controlled woodlands and the distance of over 3/4 mile to the closest residence minimizes the potential to any agricultural impact on food supplies.

C. *What is the likelihood or risk potential of such releases?*

The facility has been designed with many environmental safeguards such as the following:

- **prior to receipt of a waste it is intensively scrutinized before the waste is allowed to be shipped to the facility for storage or treatment;**
- **all waste handling areas are provided with secondary containment; and**
- **all operations are implemented by trained employees who are adequately supervised.**

Therefore, the potential has been minimized to the maximum extent possible and an emergency situation is unlikely.

D. What are the real adverse environmental impacts of the permittee's proposed facility?

As indicated above, the facility has and continues to monitor the facility on a routine basis for environmental impact of its operations as required by its current RCRA permit. There have been no impacts observed to date from the current facility operations.

1. Short term effects

There have been no short term effects nor or there any anticipated.

a. Land area taken out of system

The land taken out of the system is approximately 2 acres that serve as the burn area. Once all treatment operations are discontinued at the site, the area will be decontaminated to ensure there is no long term environmental impact.

2. Long term effects

Based on the information provided above, there are no long range impacts anticipated at the facility.

II. Does a cost benefit analysis of the environmental impact costs balanced against the social and economic benefits of the proposed facility demonstrate that the latter outweighs the former?

A. How was it determined that the facility was needed?

Thermal treatment in open burner assemblies presents the only safe and effective mechanism for deactivating many reactive hazardous wastes. Traditional incineration technologies utilize closed combustion chambers; the potential for explosions under such conditions precludes the use of such methodologies for this purpose.

1. Local or regional survey:

R&D Fabricating and Manufacturing, Inc., the predecessor entity to Clean Harbors Colfax, LLC, successfully demonstrated on multiple occasions that an emergency situation would develop unless it was authorized to conduct thermal

treatment on reactive wastes that were accumulating at various generating sites throughout the region. The LDEQ agreed and issued emergency permits to R&D to ensure that these wastes were properly managed. The need to manage these wastes in this manner (thermal treatment) remains unchanged.

2. *On-site and off-site needs:*

Clean Harbors Colfax, LLC treats off-site generated reactive wastes.

3. *Regional solid waste management benefit:*

Clean Harbors Colfax, LLC treats only hazardous reactive wastes.

4. *Generic survey of solid waste needs (compatibility with master plan):*

Clean Harbors Colfax, LLC treats only hazardous reactive wastes.

B. *What will be the positive economic effects on the local community?*

1. *How many permanent jobs will be created?*

Clean Harbors Colfax, LLC currently employs eight (8) personnel on a permanent basis.

2. *What is the expected annual payroll?*

Current annual payroll is approximately $600,000.

3. *What is the expected economic multiplier for item 82?*

One additional local job created for each initial employee.

4. *What is the expected tax base and who receives benefits?*

Property and sales taxes are paid to Grant Parish and local communities.

C. *What will be the potential negative economic effects on the local community?*

1. *What are the possible effects on property values?*

No negative impacts on the value of adjacent properties have been identified, primarily because there is no disposal of waste at the facility. A 180-acre tract of land was purchased prior to 2000 across the road from the facility for approximately $1,700/acre. This amount is up from an approximated value of $600 to $800/acre in the early 1990's.

2. *Will public costs rise for:*

a. *Police protection:*

None identified - only involvement is associated with contingency planning.

b. *Fire protection:*

None identified - only involvement is associated with contingency planning.

c. *Medical facilities:*

None identified - only involvement is associated with contingency planning.

d. *Schools:*

None identified.

e. *Roads (also see below):*

None identified - waste is delivered to the facility by truck, and the number of deliveries each day is small.

3. *Does the prospective site have the potential for precluding economic development of the area by business or industries because of risk associated with establishing such operations adjacent to the proposed facility?*

No negative impacts on the value or potential commercial or industrial use of adjacent properties has been identified.

D. *Was transportation a factor in choosing the propose site?*

The excellent road network in the vicinity was a significant factor in selecting the site.

1. *What mode(s) of transportation will be used for the site?*

a. *Truck*

Yes

b. *Rail*

No

c. *Barge*

No

d. *Other*

None

2. *What geographical area will it serve?*

Clean Harbors Colfax. LLC receives waste from local, regional, and out of state generators.

3. *By how much will local traffic volume increase?*

The facility has historically received less than 125 shipments/year.

a. *Can local roads handle the traffic volume expected?*

The roads leading to the facility from Interstate 49 are major thoroughfares that normally deal with truck traffic. There is a one-half mile section of state Route 471 leading to the facility that should not be impacted by this volume of traffic.

b. *Can local roads handle the weight of the trucks?*

The roads leading to the facility from Interstate 49 are major thoroughfares that normally deal with truck traffic. There is a one-half mile section of state Route 471 leading to the facility that should not be impacted by the low average weight of shipments.

E. *What are the long term expectations of the proposed site?*

1. *Longevity of the facility?*

The overall life of the facility is projected to be 25 years.

2. *Who owns the facility?*

Clean Harbors Colfax, LLC

3. *Are the owners backed by others?*

Clean Harbors Colfax, LLC is a wholly owned subsidiary of Clean Harbors Disposal, LLC which is a subsidiary of Clean Harbors Environmental Services headquartered in Braintree, Massachusetts.

4. *When is closure expected?*

The anticipated closure date is scheduled for July 1, 2014. Depending on market conditions and status of the regulations, this date may be revised.

5. *Who is responsible for the site after closure?*

The closure plan ensures that no hazardous wastes remain following closure (clean closure will be achieved). Therefore, no post closure care or monitoring will be required, and no restrictions on future use are anticipated.

6. *What assurances will there be that the site will be closed in accordance with the plan?*

In accordance with the existing operating permit and in anticipation of the renewal of that permit, the facility will be closed in accordance with the approved closure plan. The facility provides adequate financial assurance to ensure that the funds are available to close the facility in accordance with the approved Closure Plan.

7. *What financial assurances will be established to demonstrate the ability to handle problems after closure?*

The closure plan ensures that no hazardous wastes remain following closure (clean closure will be achieved). Therefore, no post closure care or monitoring will be required, and no restrictions on future use are anticipated.

8. *Who certifies the site is properly closed?*

In accordance with the approved closure plan, closure will be certified by an independent Louisiana registered Professional Engineer.

9. *How are people protected from unwittingly buying land after closure?*

The facility will be clean closed, so there will be no restrictions on future use of the property. No waste will remain on-site.

a. *Is the closed facility recorded in the deed?*

In accordance with the approved closure plan, the facility will achieve clean closure; therefore, no notations or restrictions on the deed will apply.

b. *What future uses are possible?*

No restrictions on future use are anticipated.

III. *Are there alternative projects which would offer more protection to the environment that the*

proposed. facility without / unduly curtailing non-environmental benefits?

No.

A. Why was this technology chosen (e.g., incineration over landfilling)?

This technology has been demonstrated through numerous government studies to be the most effective and efficient way of managing the types of wastes handled at the facility. Incineration units are not designed to handle this type of material. Landfilling is not possible without treatment due to Land Disposal Restrictions (LDR).

1. Are other technologies available?

Traditional incineration technologies are not an option for deactivating the reactive wastes managed by Clean Harbors Colfax, LLC because of the potential for unplanned explosions under the confined conditions within an enclosed incinerator chamber. The only safe alternative is controlled open combustion such as the thermal treatment units used by Clean Harbors Colfax, LLC.

2. Describe the engineering design and operating techniques used to compensate for any site deficiencies.

One of the primary reasons for selecting the site was the ideal setting for the operation. There are no inherent site deficiencies to hinder safe and environmentally sound operations.

B. Is the proposed technology an improvement over that presently available?

The Louisiana Hazardous Waste Regulations specify deactivation as the treatment standard for reactive waste prior to land disposal. The characteristics of the reactive wastes managed by Clean Harbors Colfax, LLC are those capable of detonation or explosive reaction if subjected to a strong initiating source if heated under confinement, those capable of detonation or explosive decomposition or reaction at standard temperature and pressure, those capable of reacting violently with water, or those which are classified as forbidden, Class A, or Class B explosives as defined in LAC 33:V.101. Controlled open combustion in thermal treatment units such as those used by Clean Harbors Colfax, LLC is the only safe method of treatment for these wastes; therefore, there are no alternatives for deactivating reactive wastes which would offer more protection to the environment than the technology employed by Clean Harbors Colfax, LLC.

C. Describe the reliability of technology chosen

1. Past experiences:

Clean Harbors Colfax, LLC was established to treat (deactivate) the wastes described in Part B of Question II so that the residues could be safely land disposed or recycled. Traditional incineration technologies are not an option for deactivating the reactive wastes managed by Clean Harbors Colfax, LLC because of the potential for unplanned explosions under the confined conditions within an enclosed incinerator chamber. The only safe alternative is controlled open combustion in thermal treatment units such as those used by Clean Harbors Colfax, LLC. The facility has operated safely and in compliance with its permit without incident since 1993.

2. *Environmental impacts:*

A risk assessment was completed in 1991 prior to constructing and operating the facility. No adverse environmental impacts associated with the operation of the facility were identified. Through a subsequent environmental assessment conducted in 1993, the facility confirmed that no unacceptable adverse environmental impacts could be identified. Further, air monitoring and soil sampling by the facility in accordance with the conditions of the hazardous waste permit have not identified any real adverse environmental effects of the facility (it is noteworthy that the facility is no longer required to conduct air monitoring).

D. *Describe the sequence of technology used from arrival of waste to the end process at the facility (flow chart).*

1. *Inspection of waste*
2. *Unloading*
3. *Storage*
4. *Treatment*
5. *Separation of residuals requiring further handling*
6. *Off site disposal of treated residuals (recycle or disposal)*

See Attached Flow Chart.

E. *Will the facility replace an outmoded/worse polluting one?*

The only safe methodology for deactivating the reactive wastes managed by Clean Harbors Colfax, LLC is controlled open combustion in units such as the thermal treatment assemblies used by the facility; therefore, there are no alternatives for deactivating reactive wastes which would offer more protection to the environment than the technology employed by Clean Harbors Colfax, LLC.

F. *What consumer products are generating the waste to be disposed? Are there alternative products that would entail less hazardous waste generation?*

Most of the waste received by Clean Harbors Colfax, LLC is generated by defense industry contractors and Department of Defense facilities. The primary consumer product that is treated at the facility is automobile air bag inflators, small arms ammunition manufactures and fireworks manufacturers. Alternative-technology is replacing sodium azide propellants with compressed inert gas heated with smaller quantities of non-sodium azide propellant.

IV. *Are there alternative sites which would offer more protection to the environment than the proposed facility site without unduly curtailing non-environmental benefits?*

Storage and treatment of reactives and explosives has been conducted at this location since 1984 when R&D Fabricating and Manufacturing, Inc. first began operations. The reason that this site was selected over other candidate sites is the configuration of the land tract, which provided for establishing remote internal treatment and storage areas situated well away from the facility entrance and administrative offices.

A. *Why was this site chosen?*

See explanation directly above.

1. *Specific advantages of the site:*

The layout of the land tract was especially conducive to orient the actual treatment area centrally on the site and establish as large a buffer zone as possible.

2. *Were other sites considered or rejected?*

The R&D operations were established and ongoing for several years. The development of the original RCRA Part B Permit and siting requirements were complied with easily. Based on the location, past history of the site in regard to compliance with both state and federal regulations, and accessibility but yet rural site environmental conditions there was no need to seek additional sites as candidates.

3. *Is the location of the site irrevocable; i.e., would denial of the permit based on the site preclude the project?*

The facility is currently fully permitted as a storage and treatment facility which has a history of compliance with regulatory requirements, and no environmental impacts have been indicated. In the event that the permit is denied, the capital investment already invested in the property and improvements, approximately $8,000,000, would be lost and obtaining additional funds for no apparent environmental benefit at a new location would be very difficult to justify.

B. *Is the chosen site in or near environmentally sensitive areas?*

The treatment and storage facility is not located in or near environmentally sensitive areas.

1. *Wetlands*

The treatment and storage areas were located so as to maintain a maximum distance from wetland areas not to impact wetland areas in general vicinity.

2. *Estuaries*

There are no estuaries on or near the site.

3. *Critical habitat*

There are no known endangered species or critical habitats in the vicinity of the facility. As a matter of fact, the large buffer zone created by the facility in relation to the actual storage and treatment area is environmentally beneficial in that it creates additional habitat.

4. *Historic or culturally significant areas*

There are no culturally significant areas located in the vicinity of the facility.

a. *Indian mounds*

There are no Indian mounds located on or near the facility property.

b. *Antebellum houses*

There are no Antebellum homes located on or near the facility property.

c. *Tourist attractions or facilities (e.g., bed and breakfast inns)*

There are no tourist attractions or facilities located on or near the facility property.

d. *Campgrounds and Parks*

There are no campgrounds or parks located on or near the facility property.

C. *What is the zoning and existing land-use for the prospective site and nearby areas?*

Currently, there are no zoning requirements implemented in Grant Parish. Primary land use within two miles of the facility is rural; the closest farmland is approximately two miles from the facility boundary. The estimated population within a two-mile radius of the site is 150 people.

1. *Is the site located near existing heavy industrial, chemical process or refinery operations?*

   The facility is not located near existing heavy industrial, chemical process or refinery operations.

2. *Is there a precedent for chemical contamination near the site or is the soil and water pristine?*

   Currently there is an existing solid waste management unit located on the property. It is located in the area of the old burn units that were operated prior to the existing permitted facility, prior to 1993. The environmental safeguards now in place at the current treatment units were not available to the old burn units. The facility is in the process of investigating the old burn area, and once all necessary environmental data is collected, a mutually agreed to remediation solution will be implemented.

3. *Is the area particularly noted for its esthetic beauty?*

   The facility as well as the surrounding land use is located in a very rural wooded area. Every precaution has been taken to preserve the ecological diversity in the area. Timber companies own and tree farm much of the land adjacent to the facility, so the area, except for the Clean Harbors site is subject to be clear cut as timber matures to pulp wood or saw timber.

D. *Is the site flood prone?*

The storage and treatment facility is not located within a flood prone zone as indicated in the Part B Permit application.

1. *Is the site in a flood plain?*

   According to the Federal Emergency Management Agency (FEMA), the facility is located above the current 24-hour 100-year flood plain.

   a. *How current are the maps used to make flood plain determinations?*

      FEMA, the agency charged with designation of flood plains and flood-prone areas, has issued maps that indicate that the facility is in no jeopardy of being inundated by 100-year floods.

b. *What is the elevation of the site?*

The portion of the existing facility that is used to store and treat wastes is approximately 175 feet msl.

c. *Is diking required or desired to provide flood protection?*

The facility is above the 100-year flood plain; therefore no diking is required.

(1) *What is the design height of the dike?*

This requirement is not applicable.

(2) *How is the dike protected from erosion?*

This requirement is not applicable.

(3) *What frequency and design storm was used?*

A 24-hour 25-year storm was used to determine the flood potential at the site.

(4) *Is access to the site over or through dikes?*

This requirement is not applicable.

2. *It the site hurricane vulnerable?*

Hurricane paths have infrequently crossed Grant Parish since 1900; however, wind speeds were below hurricane strength (See section 517.T.2.b. of the Part B Permit application).

a. *Is the site in an area subject to storm surge?*

Due to the inland location of the facility and Grant Parish, there is no potential for the area to be subject to storm surges.

b. *What are the design storm specifications?*

As mentioned above, hurricanes that have traversed Grant Parish in the past have winds less than hurricane force and the design specifications for the treatment area have been set for a 24-hour 25-year storm.

c. *Should damage from wave action be considered?*

No. This requirement is not applicable.

d. For what levels of wind speed is the facility designed?

The storage and treatment units consist of ATF approved magazines and concrete units which would be unaffected by the expected with severe wind loading. There were no specific criteria used in constructing the buildings outside of normal building code requirements.

E. Is groundwater protected?

As indicated earlier, the regulated units that process and treat wastes are secondarily contained, and all liquids are managed in accordance with Part B Permit required conditions. In addition, the facility has adequately documented groundwater conditions in Section 2 of the 1994 Environmental Assessment Report.

1. Are aquifers or recharge area underlying the site used for drinking water?

In light of the information indicated above, there are aquifers located below the site that are used for drinking water; although protected by natural barriers as well as man made barriers.

2. What is the relationship of the site to the water table?

The water table aquifer is located at approximately 152 feet msl or approximately 35 feet below. the elevation of the treatment and storage units.

3. What wells exist in the area?

There are eleven water wells located within two miles of the facility. Information is included in the Part B Permit application on the specifics on each well.

4. What is the flow rate and direction of the groundwater?

The flow direction of the aquifer is south-southeast at a flow rate of approximately 10 feet per year.

5. What is the groundwater quality in the underlying aquifers?

The ground water quality is considered to be typical for the region and is explained in great detail in section 2 of the 1994 Environmental Assessment report.

6. *It there a hydraulic connection between the aquifers?*

There is limited interconnection between the lower and upper aquifers through interbedded sands and clays. The site hydrogeology is detailed in Section 2 of the 1994 Environmental Assessment report.

F. *Does the prospective site pose potential health risks as defined by proximity to:*

1. *Prime agricultural area (crop and pasture land)*

The facility is approximately two miles from the nearest farmland; therefore, there is no potential risk associated from operations at the site.

2. *Residential area*

The closest resident to the site is approximately 3,500 feet from the storage and treatment area.

3. *Schools or day care centers*

There are no schools and day care centers located in the vicinity of the site.

4. *Hospitals or prisons*

There are no hospitals or prisons located in the vicinity of the facility property.

5. *Public buildings or entertainment facilities*

There are no public buildings or entertainment centers located in the vicinity of the facility property.

6. *Food storage area*

There are no food storage areas located in the vicinity of the facility property.

7. *Existing community health problems that may be aggravated by operation of additional hazardous waste disposal capacity.*

There have been no documented community health related problems in the area. The facility is located in attainment area for air pollutants.

G. *Is air quality protected?*

The facility has routinely collected air monitoring data over the life of the existing permit, and no impacts were indicated as result of these monitoring events. The site currently operates under the authority of an LADEQ small source air quality permit.

1. *Is the site within an ozone or non-attainment area?*

The facility is located in an attainment area for air pollutants including ozone.

2. *What contaminants are likely to be generated by the site?*

Based on the existing waste burn rates and materials expected to be treated, the facility air permit (1120-00010-01) calculates the following emissions:

PM-10	**2.40 tons per year**
N0x	**38.90 tons per year**
VOC	**0.16 tons per year**
CO	**6.80 tons per year**
Other (HCl)	**4.60 tons per year**

3. *What protection is afforded from each contaminant generated by the site?*

Based on the low emission rates from the facility, the LADEQ does not require any engineering controls but do place administrative controls on the operation by restricting the throughput for the burn units.

4. *What is the potential for unregulated emissions?*

There is no potential for unregulated emissions from the burn units as long as the facility complies with the regulatory restrictions for the types and amount of waste burned at the site.

5. *What plans are implemented to provide for odor control?*

The wastes that the facility processes do not have or create offensive odors, and there is no need to implement odor controls. The facility has operated since 1984, and as far as the facility is aware, no odor problems have ever been alleged.

6. *Who will be affected by emissions?*

Due to the low emission rates generated by the burn units, there will not be any receptors down wind of the facility who will affected by the

emissions.

a. *What is the direction of the prevailing winds?*

The prevailing winds are primarily out of a westerly direction.

b. *Describe the expected frequency of "bad air" conditions?*

Because the area is located in an attainment area and atmospheric inversions are not anticipated, "bad air" days are not applicable for the facility.

7. *Describe the control of vapors at various stages of the process.*

The only potential for the facility to release vapors to the atmosphere is from the burn units. Based on the low emission rates from the facility, the LADEQ does not require any engineering controls but do place administrative controls on the operation by restricting the throughput for the burn units. There is no potential for unregulated emissions from the burn units as long as the facility complies with the regulatory restrictions for the types and amount of waste burned at the site.

H. *Have physical site characteristics been studied; what has been done in terms of a geo-technical investigation?*

The site has been studied thoroughly during the initial RCRA Part B Permit application and detailed in the 1994 Environmental Assessment Report.

1. *Site geology*

Addressed in the 1994 Environmental Assessment Report.

2. *Hydrology*

Addressed in the 1994 Environmental Assessment Report.

3. *Topography*

Addressed in the 1994 Environmental Assessment Report.

4. *Soil properties*

Addressed in the 1994 Environmental Assessment Report.

5. *Aquifer location*

Addressed in the 1994 Environmental Assessment Report.

6. *Subsidence problems*

Addressed in the 1994 Environmental Assessment Report.

7. *Climatic Conditions*

Addressed in Appendix O of the Part B Permit renewal application. This appendix provides data on the temperature, expected rainfall, paths of past hurricanes, evapotranspiration rates and prevailing wind direction.

V. *Are there mitigating measures which would offer more protection to the environment than the facility as proposed without unduly curtailing non-environmental benefits?*

A. *Is this facility part of a master plan to provide waste management? Whose plan?*

Clean Harbors Colfax, LLC provides a safe and environmentally sound option for treating reactive hazardous waste. Prior to the issuance of the hazardous waste final permit to the facility, LADEQ recognized that an emergency would develop unless the reactive wastes could be managed by thermal treatment. Accordingly, LADEQ issued emergency permits authorizing the operation of the facility. The Clean Harbors Colfax, LLC, therefore, provides a significant. contribution to the overall waste management plan for the State of Louisiana.

1. *How does it fit into the plan?*

There are no other management options available for the treatment of wastes received by Clean Harbors Colfax, LLC. There is no safe way to overcome the technological limitations associated with incinerating these wastes. Thermal treatment is the only technology available to safely deactivate the reactive wastes managed by Clean Harbors Colfax, LLC.

2. *What geographical area is served by the plan?*

Clean Harbors Colfax, LLC receives waste from local, regional, and out of state generators.

B. *Does the facility fit into an integrated waste management system?*

1. *On-site*

Clean Harbors Colfax, LLC is solely a reactive hazardous waste treatment facility.

2. *Regional*

Clean Harbors Disposal Services, LLC has other facilities in Louisiana

and in other states, which treat and dispose other types of hazardous and solid waste. Clean Harbors Colfax, LLC is the only commercial facility capable of handling these types of reactive wastes.

C. *Can waste be disposed of in another fashion (way)?*

1. *Technology limitations:*

Traditional incineration technologies are not an option for deactivating the reactive wastes managed by Clean Harbors Colfax, LLC because of the potential for unplanned explosions under the confined conditions within an enclosed incinerator chamber. The only safe methodology for deactivating the reactive wastes managed by Clean Harbors Colfax, LLC is controlled open combustion in units such as the thermal treatment units used by the facility; therefore, there are no alternatives for deactivating reactive wastes which would offer more protection to the environment than the technology employed by Clean Harbors Colfax, LLC.

2. *Cost factors:*

None, see C.1 of Question V.

3. *Other reasons:*

None

D. *What quality assurance control will be utilized to protect the environment?*

1. *Plans for lab work:*

Incoming wastes are not sampled due to the reactive nature of the waste. Clean Harbors Colfax, LLC gathers sufficient information on incoming waste streams to allow proper storage and treatment without compromising worker safety. Chemical and physical analyses of each type of waste are generally provided by the generator. These analyses or analyses obtained from other reputable sources, such as the Department of Defense, will be referenced in the incoming waste records for each type of waste accepted at the facility.

2. *How are out-of-spec waste handled?*

Out-of-spec wastes are rejected in accordance with the procedure in D.3.

3. *What happens to rejected wastes?*

Rejected shipments of hazardous waste will be properly routed back to

the original generator, and the required documentation will be made in the Facility Operating Record (i.e., on the respective manifest copies).

4. *Treatment stabilization:*

None

5. *Segregation of non-compatible wastes:*

Incompatible wastes will be identified as part of the check-in procedure. Incompatible wastes are stored in separate storage units to eliminate accidental reaction that could cause an unplanned event. The truck staging/parking area has been sectioned with secondary containment structures to handle incompatible wastes in the event of a leak.

6. *Handling of containerized wastes:*

The design of the storage magazines ensures that standing liquids do not develop within the magazines and that wastes do not come into contact with ponded precipitation. The covered staging area at the entrance to Magazine numbers 8, 9, and 10 is constructed for unloading liquid reactive wastes. The preparation building is covered to prevent rainfall from entering the area. Waste is received only in approved DOT containers.

E. *Innovative techniques used to control release of waste or waste constituents into the environment.*

1. *Surface Impoundment*

None

2. *Land Application Treatment*

None

3. *Landfill (burial)*

None

4. *Incinerator*

The facility does not have an incinerator, but for the purposes of this section, the thermal treatment units (open burners) will be described. There is a large concrete unit with twenty (20) metal burn trays on concrete platforms. Each burn tray is equipped with a portable cover. The treatment area is located a sufficient distance from the storage areas

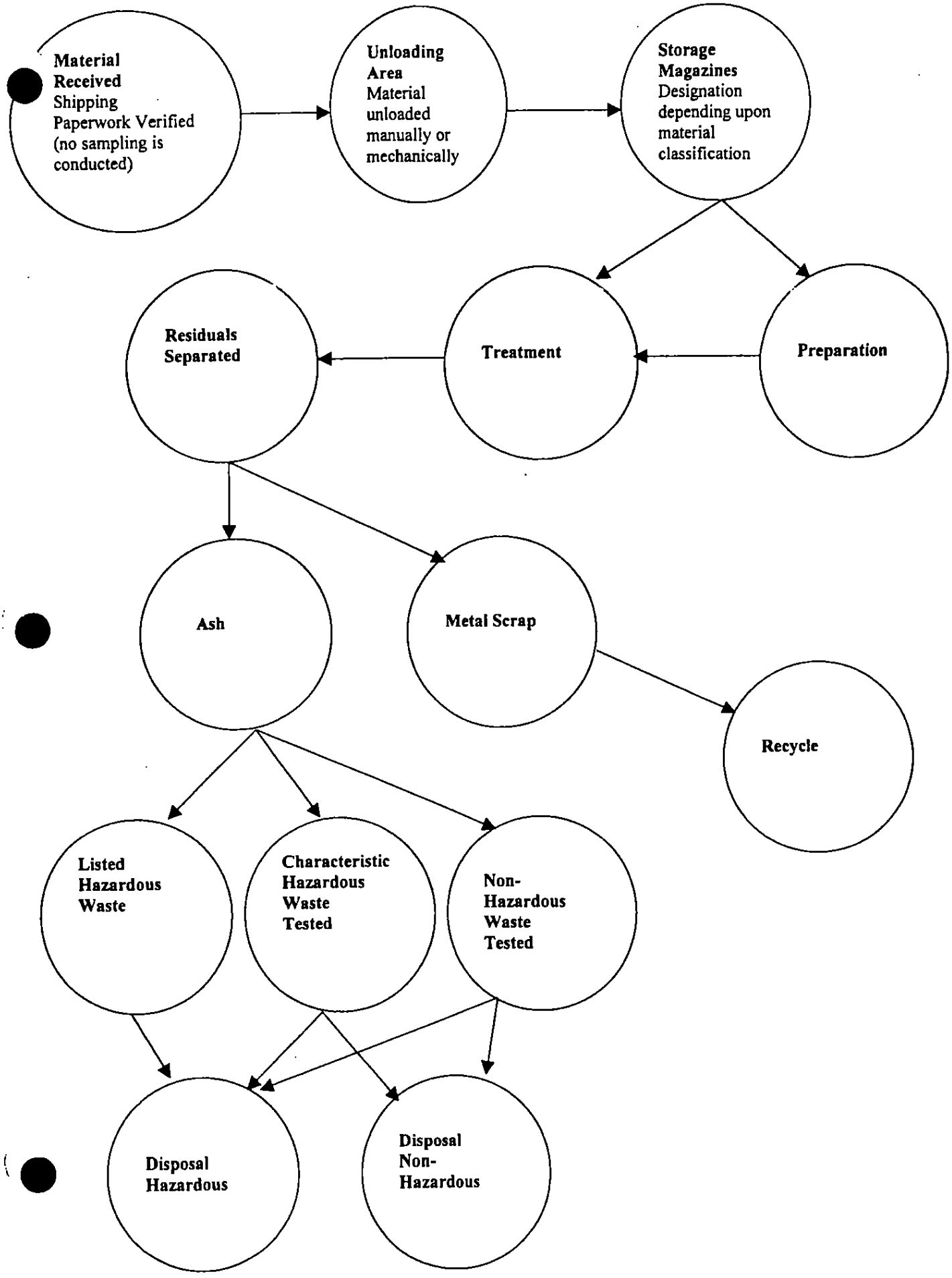
based on ATF requirements to limit the potential for an incident at one location to spread to the other. Buffer zones of at least 660 feet separate the treatment units and site boundaries. The construction of the burner assemblies provides the necessary safeguards to minimize the entrance of rainwater and preclude surface run-on. Minimizing the entrance of rainwater, precluding run-on into the treatment process, and controlling run-off from the treatment area will insure that waste constituents are not transported to the ground water or subsurface environment. Furthermore, under the controlled burning methods used at the facility and based on the findings of a 1991 study of the thermal treatment system, there is minimal potential for migration of treated residues as thorough treatment of the waste materials will minimize the potential for impacting the air and groundwater. Additionally, air emissions are limited administratively by throughput capacity based on the air permit issued by LADEQ.

5. *Container storage:*

Wastes are stored in properly designated storage magazines that are well ventilated to minimize the build-up of extreme heat and pressures. These covered, totally enclosed magazines do not allow the entrance of precipitation and meet the requirements for storage structures as established by the ATF. The storage and treatment areas are located a sufficient distance apart based on ATF requirements to limit the potential for an incident at one location to spread to the other. Buffer zones of at least 660 feet separate storage units and site boundaries.

6. *Tanks*

None


Material Received
Shipping Paperwork Verified (no sampling is conducted)
Unloading Area
Material unloaded manually or mechanically
Storage Magazines
Designation depending upon material classification
Residuals Separated
Treatment
Preparation
Ash
Metal Scrap
Recycle
Listed Hazardous Waste
Characteristic Hazardous Waste Tested
Non-Hazardous Waste Tested
Disposal Hazardous
Disposal Non-Hazardous